



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

APPALACHIA

NAB
2
Ap5
Y.1

HARVARD UNIVERSITY

Library
of
The School of
Landscape Architecture



APPALACHIA

THE JOURNAL OF

THE APPALACHIAN MOUNTAIN CLUB

VOL. I

1876-1878



BOSTON
HOUGHTON, OSGOOD AND COMPANY
THE RIVERSIDE PRESS, CAMBRIDGE
1879

△

May 10, 1926
SCHOOL OF
LANDSCAPE ARCHITECTURE
HARVARD UNIVERSITY
(I-8V + index to I-8)

3834

25

CONTENTS.

	Page.
INTRODUCTORY	1
CONSTITUTION	3
ADDRESSES.	
President's address, January, 1877. By E. C. Pickering, . . .	63
President's address, January, 1878. A year of exploration in North America, by S. H. Scudder,	207
SPECIAL PAPERS.	
<i>Committee of the Club.</i> Nomenclature of the White Mountains, Concerning the true name of the North- ern Kearsarge,	152
<i>J. R. Edmands.</i> The topographical camera,	169
The White Mountains from Monadnock (with profile, pl. 11),	269
<i>C. E. Fay.</i> Concerning the name of Black Mountain (with profiles, pl. 4),	90
<i>J. B. Henck, Jr.</i> New map of the White Mountains (pl. 3), . .	26
The application of photography to moun- tain surveys,	96
<i>C. H. Huchcock.</i> The Atlantic system of mountains (abstract),	11
Geology of the White Mountains (with map, pl. 7),	70
Glacial markings among the White Mts.,	243
<i>S. W. Holman.</i> Two new forms of mountain barometer, . . .	25
<i>J. H. Huntington.</i> The flowering plants of the White Moun- tains,	100
<i>Mrs. W. G. Nowell.</i> A mountain suit for women,	181
<i>E. C. Pickering.</i> The micrometer level,	138
<i>W. H. Pickering.</i> Distant points visible from Mt. Washington,	86
Portable instruments,	166
<i>S. H. Scudder.</i> A list of Alpine serials,	198
<i>W. Upham.</i> Unnamed mountains between Mt. Hancock and Scar Ridge,	252
Map of the White Mountains, (pl. 9),	184

ASCENTS, EXCURSIONS, AND EXPLORATIONS.

	<i>Page.</i>
<i>F. W. Clarke and G. Lanza.</i> An ascent of Scar Ridge, . . .	247
<i>G. Dimmock.</i> A trip to Mt. Mitchell, in North Carolina, . .	141
<i>J. R. Edmands.</i> A descent through King's Ravine, . . .	93
Map of the Mt. Adams Path (with plot, pl. 8), . .	180
<i>C. E. Fay.</i> A day on Tripyramid (with profiles, pl. 1 and 2), .	14
Black Mountain; two excursions, . . .	119
<i>J. B. Henck, Jr.</i> Mt. Willey,	120
Mt. Tremont,	124
<i>G. Lanza.</i> (See <i>F. W. Clarke and G. Lanza</i>).	
<i>W. G. Nowell.</i> Carter Dome and vicinity; an exploration (with profile, pl. 5, 6),	76
The Mt. Adams Paths,	174
<i>E. C. Pickering.</i> Mt. Liberty,	122
<i>W. H. Pickering.</i> Mts. Webster, Jackson, Crawford, Resolu- tion and the Giant's Stairs,	121
<i>S. H. Scudder.</i> A partial ascent of Sierra Blanca (with map, pl. 10),	258
<i>W. Upham.</i> The east branch of the Pemigewasset, . . .	29
<i>Miss M. F. Whitman.</i> A climb through Tuckerman's Ravine, .	131
<i>J. Worcester.</i> The Moat path,	267

COUNCILLOR'S REPORTS.

Natural History; by <i>T. S. Hunt</i> ,	35
By <i>B. P. Mann</i> ,	185, 274
Topography; by <i>C. H. Hitchcock</i> ,	38
By <i>J. R. Edmands</i> ,	186, 275
Art; by <i>C. E. Fay</i> ,	45
By <i>J. Worcester</i> ,	188, 277
Exploration; by <i>L. F. DePourtales</i> ,	49
By <i>J. R. Edmands</i> ,	117
By a special committee,	189, 282
Improvements; by <i>W. G. Nowell</i> ,	51, 109, 194, 286

BUSINESS OF THE CLUB.

Reports of Secretary. By <i>J. B. Henck, Jr.</i> ,	107, 272
“ “ Treasurer. By <i>H. F. Walling</i> ,	109, 273
Lists of Officers,	5, 126, 300
Lists of Members,	5, 126, 200, 300
Proceedings of the Club,	58, 127, 201, 301

MISCELLANEOUS.

Blank list of plants,	274
List of paintings exhibited in March, 1877,	280
Blank for recording observations on excursions,	285
Catalogue of the Library. By <i>G. Dimmock</i> ,	290
Index	305
List of illustrations,	308

INDEX.

- Active members, 5, 126, 200, 300.
 Address by the president, 63, 207.
 Alpine clubs, publications of, 198.
 Art, report of councillor, 45, 188, 277.
 Ascent of Scar Ridge, 247; of Sierra Blanca, 258.
 Atlantic system of mountains, 11.
- Barometers, mountain, 25, 167.
 BIGGLOW, E. B. Elected treasurer, 59; declines the office, 59.
 Black Mt., 90, 119.
 Blank for observations by explorers, 285.
 Botanical work, report on, 185, 274.
 Botany of White Mts., 100, 201.
 Bottles placed on summits, 116, 289.
 BOUTON, N. On the application of the name Kearsarge, 203.
 Boy Mt., path on, 110.
 BURBANK, L. F. Rocks of Cambridge basin, 204.
- Camera, topographical, 169.
 Camping equipments exhibited, 204.
 Camps, construction suggested, 56; constructed, 115, 288.
 Cannon Mt., 301.
 Carter Dome, 76; proposed path on, 111, 195.
 Carter Notch, 205; proposed paths in, 195; paths constructed in, 286.
 Catalogue of Library, 290.
 CLARKE, F. W. Trips about Franconia Mts., 301.
 CLARKE, F. W., and LANZA, G. An ascent of Scar Ridge, 247.
 COMMITTEES APPOINTED: on organization, 58; nomenclature, 58, 302; summer work, 60; field meetings, 62; nominations, 129, 303; Capt. Howgate's proposed arctic expedition, 201; explorations, 202, 302; application of the name Kearsarge, 203; sections of the Club, 304; incorporation, 304.
 COMMITTEE REPORTS: on nomenclature, 7, 58; organization, 58, 59; exploration, 189, 282; the true name of the northern Kearsarge, 152, 302; Capt. Howgate's proposed arctic expedition, 303.
 Constitution, 8; amendments to, 128, 129.
 Corresponding members, 200, 300.
 Councillor's reports. *See* the different departments: Natural History, Topography, Art, Exploration, Improvements.
- DIMMOCK, G. A trip to Mt. Mitchell in North Carolina, 141; catalogue of the library of the Club, 290.
- Distances, measurement of, 50.
- East branch of Pemigewasset, 29.
 EDMANDS, J. R. Portable camera, 61; a descent through King's ravine, 93; report of councillor of exploration, 117; elected councillor, 126, 128, 300; pack saddle and camera, 127; the topographical camera, 169; map of the Mt. Adams paths, 180; report of councillor of topography, 186, 275; the White Mountains from Monadnock, 269; destruction of a rubber blanket by quadrupeds, 302.
 EMERY, G. E. Pequawket vs. Kearsarge, 60; on the application of the name Kearsarge, 202.
 Excursion to Fabyan's, 127; to Lexington, 206; to Mt. Washington, 301.
 Exhibition of paintings and sketches, 202, 280.
 Exploration, report of councillor, 49, 117, 189, 282; regions needing, 49; three fields for, 61; directions for observers, 191, 285.
- Fabyan's, excursion to, 127.
 FAY, C. E. Elected councillor, 5, 59; a day on Tripyramid, 14; report of councillor of art, 45; concerning the name of Black Mt., 90; Black Mt., two excursions, 119; elected vice president, 126; mountains visible from Arlington Heights, 204; elected president, 300.
 Field meetings, 127, 204, 206, 301.
 FOX, G. V. Pequawket vs. Kearsarge, 60; on the application of the name Kearsarge, 202.
- Geology of the Appalachians, 11; of the White Mts, 70.
 Giant's Stairs, 121.
 Glacial markings in White Mts., 243.
 Gordon's trail, 52.
 Guidebook to White Mts., 58, 201.
 Gulf path, 53.
- HENCK, J. B., JR. Elected secretary, 5, 59, 126, 300; new map of the White Mts., 26; the application of photography to mountain surveys, 96; secretary's report for 1876, 107; for 1877, 272; Mt. Willey, 120; Mt. Tremont, 124.
 HITCHCOCK, C. H. Elected councillor 5, 59; the Atlantic system of mountains, 11; report of councillor of topography, 38; model of White Mts., 58; Geology

- of the White Mts., 70, 127; on the application of the name Kearsarge, 202; glacial markings among the White Mts., 243; elected vice-president, 300.
- HOLMAN, S. W. Two new forms of mountain barometer, 25.
- Honorary members, 200, 300.
- HUNT, T. S. Elected councillor, 5, 59, 126; report of councillor of natural history, 35; geology of region about Sierra Blanca, and of Black Mts. of North Carolina, 301; on bare spots on mountain summits, 302.
- HUNTINGTON, J. H. The flowering plants of the White Mts., 100; exploration of the sources of the Connecticut River, 201; elected councillor, 300.
- Improvements, report of councillor, 51, 109, 194, 286.
- Inclinometer, 187.
- Incorporation, committee on, 304.
- Instruments, portable, 166.
- Introduction, 1.
- JENNEY, W. On a waterproof tent, 204.
- Kearsarge vs. Pequawket, 202. *See also* Northern Kearsarge.
- King's Ravine, 98.
- LANZA, G. AND CLARKE, F. W. An ascent of Scar Ridge, 247.
- Level, pocket, 168; micrometer, 43, 138.
- Lexington, excursion to, 206.
- Library of the Club, 107; place for, 61; donation to, 205; catalogue of, 290.
- LOWE, C. E. Paths on Mt. Adams, 301. Lowe's path, 61.
- MANN, B. P. Report on botanical work, 185, 274.
- MANN G. C. Colored contour map of U. S., 127; botanical excursions on the Great Range, 201.
- Map of White Mts., 26, 184.
- Meetings, preliminary, 58; special, on topography, 60; field, 137, 204, 206, 301.
- MEMBERS, ACTIVE, 5, 126, 200, 300.
- MEMBERS, CORRESPONDING, 200, 300.
- MEMBERS, HONORARY, 200, 300.
- Memorial to Congress on the work of the Coast Survey, 303.
- Micrometer level, 43, 138.
- Moat path, 267, 258.
- Monadnock, White Mts. from, 269.
- MORSE, E. S. Elected councillor, 59; declines the office, 59; new form of knapsack, 60.
- Mt. Adams, camp on, 115; paths, 51-53, 112, 174, 194, 286; map of paths, 180.
- Mt. Bond, 303.
- Mt. Crawford, 121.
- Mt. Guyot, 303.
- Mt. Hancock, unnamed mountains near, 252.
- Mt. Jackson, 121.
- Mt. Katahdin, 128.
- Mt. Liberty, 122.
- Mt. Madison, paths on, 52.
- Mt. Mitchell, N. C., a trip to, 141.
- Mt. Moriah, proposed paths on, 196.
- Mt. Occum, 303.
- Mt. Resolution, 121.
- Mt. Starr King, proposed paths on, 196.
- Mt. Samoset, 301.
- Mt. Surprise, proposed paths on, 196.
- Mt. Tremont, 124.
- Mt. Willey, 120, proposed path on, 196.
- Mt. Washington, paths about, 51-53; distant points visible from, 86; excursion to, 301.
- Mt. Webster, 121.
- Mountain barometers, 25, 167.
- Mountain suit for women, 181, 193, 204.
- Mountain surveys, application of photography to, 96.
- Name of Black Mt., 90; of the northern Kearsarge, 152.
- Names of mountains, resolutions concerning, 90, 127.
- Natural history, report of councillor, 35, 186, 274.
- New Hampshire, sections into which the State is divided, 8.
- NILES, W. H. Elected councillor, 300.
- Nomenclature of White Mts., 7.
- Northern Kearsarge, the proper name of, 60, 152, 202; ascent of, 127.
- NOWELL, W. G. Elected councillor, 5, 59, 126, 300; report of councillor of improvements, 51, 109, 194, 286; Carter Dome and vicinity, 76, 128; new path up Mt. Adams, 127; limits of flowering plants on White Mts., 128; on scrub fir, 128; botanical statistics, 130; plane table work, 129; the Mt. Adams paths, 174.
- NOWELL, MRS. W. G. A mountain suit for women, 181.
- Observations of explorers, how taken, 191, 286.
- OFFICERS for 1876, 5, 59; for 1877, 126; for 1878, 300.
- Osgood's White Mt. guide book, 58, 201.
- Paintings and sketches exhibited, 202, 280.
- Paths proposed, 51, 194; method of construction, 55.
- Path on Boy Mt., 110; on Carter Dome, 111; in Carter Notch, 205; on Moat Mt., 267; on Mt. Adams, 112, 174; map of same, 180.
- Pedometer, 166.
- Pequawket, proper name of, 60.
- Pequawket, vs. Kearsarge, 202. *See also* northern Kearsarge.
- Pemigewasset, east branch of, 29.
- Photography applied to mountain surveys, 96.
- PICKERING, E. C. Invites persons interested in mountain exploration to form a club, 58; elected president, 5, 59; Bond's mss. on the White Mts., 60; annual address of the president, 63; Mt. Liberty, 123; micrometer level, 127, 138; refraction of the atmosphere, 301.

- PICKERING, W. H. Distant points visible from Mt. Washington, 86; Mts. Webster and Jackson, Mts. Crawford, Resolution, and the Giant's Stairs, 121; portable instruments, 166; distant points visible from White Mt. summits, 192; from Arlington Heights, 204; substitute for plane table, 205; ascents in Maine, 301; milestones on Mt. Washington carriage road, 301.
- Plane table, radiating, 42; ordinary, 43.
- Plants of White Mts., 100.
- Poisoning by veratrum, 129-30.
- POURTALES, L. F. Elected councillor, 5, 59; report of councillor of exploration, 49; resignation of, 128.
- POWELL, J. W. Volcanic regions of the west, 180.
- President's address, 63, 307.
- Proceedings of the Club, 58-62, 137-40, 201-06, 301-04.
- Profile Mt., 301.
- Profiles of Tripyramid, 23.
- Record bottles suggested, 56; placed on summits, 116, 289.
- Report on botanical work, 185, 274.
- Reports of committees. *See* Committee reports.
- Reports of councillors. *See* the different departments: Natural History, Topography, Art, Exploration, Improvements.
- Report of secretary for 1876, 107; for 1877, 272.
- Report of treasurer for 1876, 109; for 1877, 273.
- Resolutions concerning names of mountains, 90, 127; concerning sections of the Club, 304.
- Sandwich Dome, 90, 119.
- Scar Ridge, ascent of, 247; unnamed mountains near, 252.
- SCUDDER, S. H. Elected vice-president, 5, 59; on the proper name of the mountain called Pequawket or Kearsarge, 60; elected president, 126; a list of alpine serials, 198; a tent, 205; annual address of the president, a year of exploration in North America, 207; a partial ascent of Sierra Blanca, 258.
- Scudder's path, 52.
- Secretary's report for 1876, 107; for 1877, 272.
- Sections of the Club, 304.
- Sextant, 168.
- SHALER, N. S. On explorations of the Appalachian region in the south, 61.
- Sierra Blanca, partial ascent of, 258.
- Signals, 41.
- SPARKS, MRS. J. Gift from; 128; vote of thanks to, 128.
- Surveys, application of photography to, 96.
- SWEETSER, M. F. Doubtful names of mountains in New Hampshire, 58.
- Telemeter, 43.
- Thanks voted to Mrs. Sparks, 128; to Mass. Institute of Technology, 129.
- Topographical camera, 189.
- Topography, report of councillor, 38, 186, 275.
- Treasurer's report for 1876, 109; for 1877, 273.
- Tripyramid, a day on, 14; profiles of, described, 23.
- Tuckerman's Ravine, a climb through, 181; proposed path in, 196.
- Unnamed mountains, 252.
- UPHAM, W. East branch of the Pemigewasset, 29; unnamed mountains between Mt. Hancock and Scar Ridge, 252.
- Veratrum, poisoning by, 129-30.
- WALLING, H. F. Elected treasurer, 5, 59, 126, 300; treasurer's report for 1876, 109; for 1877, 273; map of New Hampshire, 129.
- White mountain region, elevations in, 44.
- White Mts., nomenclature of, 7; map of, 26, 184; primary stations determined, 40; points to be determined, 40; geology of, 70; flowering plants of, 100; glacial markings in, 243; seen from Monadnock, 269.
- WHITMAN, Miss M. F. A climb through Tuckerman's Ravine, 131.
- Women, a mountain suit for, 181, 193, 204.
- WORCESTER, J. Summer rendezvous of the Club, 59; elected councillor, 126, 300; report of councillor of art, 188, 277; on the application of the name Kearsarge, 203; the Moat path, 267.

LIST OF ILLUSTRATIONS.

- Plates [1, 2]. Profiles of Tripyramid.
Plate [3]. Sketch Map of White Mountains, giving the location and nomenclature of the mountain summits.
Plate 4. Profiles of Black Mountain.
Plates 5, 6. Profiles of Carter Dome.
Plate [7]. Contour map of White Mountain District.
Plate 8. Plot of the Mt. Adams Path.
Plate 9. Contour map of White Mountain district of New Hampshire.
Plate 10. Contour map of the region about Sierra Blanca, Colorado.
Plate 11. Camera sketch of the White Mountains from Monadnock.

APPALACHIA.

VOL. I.

BOSTON, JUNE, 1876.

No. 1.

Introductory.

THE Appalachian Mountain Club was organized early in 1876 for the advancement of the interests of those who visit the mountains of New England and adjacent regions, whether for the purpose of scientific research or summer recreation. It will be seen, by reference to the Constitution of the Club, that provision is made for five departments of work, each of which is placed under the guidance of a member of the Council selected for that purpose. The Club will carry on a systematic exploration of the mountains of New England and adjacent regions, publishing its results from time to time, and will collect books, maps, photographs, sketches and all available information of interest or advantage to frequenters of the mountains. It will also encourage the opening of new paths, clearing of summits from which views may be obtained, and other improvements.

At the same time, the Club, recognizing the importance of connecting its special work among the Appalachians with the general results of investigations elsewhere, will encourage the study of comparative geography in general, opening its meetings to contributions, both scientific and popular, on zoological and botanical geography, geology, topography, hydrography, travel and exploration. It will collect works upon these topics, with maps, charts, and photographs of all parts of the world, and by the customary courtesies of exchange and correspondence, will enter into relationship with organizations of a similar character elsewhere.

The publications of the Club, of which the present number is the first, will include reports of its meetings, descriptions of trips among the mountains, papers upon the physics, geography and natural history of these regions, and specific directions for investigations in the field. The results of each year's work will also be given in full, illustrated by maps of the various regions visited. Profiles of views from various places, which will greatly aid the traveller in identifying prominent points, will also be published. The Club desires to collect all the information possible regarding the attractions of various portions of the mountains, the accommodations of the various inns, and, in fact, all such information as would be of interest to the artist, pedestrian or student. Members and others are requested to collect all facts concerning the designation of mountains now known by different names; for while it would be absurd to replace a well established name by another merely for caprice, yet a careful examination and discussion of the facts in the case will enable one to form a much more correct estimate of the propriety of applying a given name to a mountain than any evidence obtained in a single spot from half a dozen of the residents. This is especially important in the case of the mountain near Conway, known as Pequawket, Kiarsarge and Kearsarge, and the mountain near Campton and Sandwich, known as Black or Sandwich Dome, since both of these are important Coast Survey Stations. In a future number some of these will be discussed; and should the demand for a publication of this nature prove sufficiently great, a second part of the volume may be expected at no distant day. Eventually it is hoped that the Club may be able to publish a detailed and accurate map of the White Mountains upon a large scale and in the very best style of workmanship; much of the summer's work of its members will be devoted to that end, and preliminary maps of portions of the field will be published in APPALACHIA from time to time, in preparation of the completed chart.

Constitution.

ARTICLE I. The Association shall be called the APPALACHIAN MOUNTAIN CLUB.

ART. II. The objects of the Club are to explore the mountains of New England and the adjacent regions, both for scientific and artistic purposes; and, in general, to cultivate an interest in geographical studies.

ART. III. The Club shall consist of Active, Corresponding and Honorary Members. Active members must be residents of New England and shall alone be eligible to office, entitled to vote, or subject to the payment of fees. The number of Honorary members shall not exceed twenty-five.

ART. IV. Elections shall be made by ballot, and the affirmative votes of two-thirds of the members present shall be necessary to election. Nominations to active membership shall be made in writing by at least two members, and forwarded to the Council through the Secretary. Should the Council by a majority vote approve the nomination, the Secretary shall announce the candidature at the next regular meeting of the Club, and balloting shall take place at the succeeding regular meeting. Nominations for Corresponding or Honorary members shall proceed directly from the Council, but shall otherwise be subject to the same rules. The admission fee shall be two dollars; and until this is paid, and the candidate has signed the Constitution, active membership is not acquired.

ART. V. The officers of the Club shall be a President, Vice-President, Secretary and Treasurer; and five Councillors, who, together with the higher officers, shall form a governing board to be termed the Council.

ART. VI. Officers shall be chosen by ballot at the annual meeting in January; but if any office shall become vacant during the year, the vacancy may be filled by a new election. The President and Vice-President shall not hold their respective offices two consecutive years, nor the Councillors more than three consecutive years.

ART. VII. The President, or in his absence the Vice-President, shall preside at all meetings of the Club and Council. He shall also prepare for the annual meeting an address upon some appropriate subject, with a review of the operations of the Club the previous year.

ART. VIII. The Secretary shall conduct the official correspondence, keep a record of the Club and Council, and have charge of all books, maps and manuscripts.

ART. IX. Under the direction of the Council, the Treasurer shall collect, take charge of and disburse all funds belonging to the Club, and shall present a report upon its financial condition at the annual meeting.

ART. X. The five Councillors shall be chosen to represent the departments of Natural History, Topography, Art, Exploration and Improvements. It shall be their duty to offer to the Council each spring a plan for the summer's work, and to recommend places at which field meetings shall be held; and at the November meeting to report to the Society the operations of the Club during the preceding summer. The Councillors are authorized, at any time between January and May, to call special meetings of those interested in their respective subjects, at which they shall act as Chairmen.

ART. XI. The Council shall be the managing board of the Club, control all expenditures, make rules for the use of its property, and act for its interests in any way not inconsistent with the Constitution.

ART. XII. Regular meetings of the Club shall be held on the afternoon of the second Wednesday of every month from October to June, and field meetings at such times during the summer months as the Council shall determine. The January meeting shall be the annual meeting for the election and reports of officers. Eleven members shall form a quorum for business.

ART. XIII. Every active member shall be subject to an annual assessment of two dollars, due at the annual meeting; but no assessment shall be required of any member during the six months succeeding his election. The President and Treasurer are authorized to remit this fee, *sub silentio*, when they deem it advisable. Commutation may be purchased for thirty dollars.

ART. XIV. This Constitution may be altered only by a vote to that effect of three-fourths of the members present at two consecutive regular meetings of the Club, notice of the proposed change having been given to all the members.

Officers for 1876.

President, EDWARD C. PICKERING.

Vice-President, SAMUEL H. SCUDDER.

Secretary, J. B. HENCK, JR.

Treasurer, H. F. WALLING.

COUNCILLORS :

Natural History, T. STERRY HUNT.

Topography, C. H. HITCHCOCK.

Art, CHARLES E. FAY.

Exploration, L. F. POURTALES.

Improvements, W. G. NOWELL.

Active Members.

Allen, J. A., Cambridge, Mass.	Clarke, F. W., Boston, Mass.
Allen, W. E., Worcester, Mass.	Cogswell, P. B., Concord, N. H.
Anthony, G. C., Providence, R. I.	Covill, William J., So. Boston, Mass.
Arnold, George B., Woonsocket, R.I.	Crosby, W. O., Boston, Mass.
Avery, Charles E., Boston, Mass.	Cross, Charles R., Jamaica Pl., Mass.
Avery, George A., " "	Cunningham, J. H., Boston, "
Bacon, John W., Natick, "	Currier, S. E. D., " "
Bancroft, Robert H., Boston, "	Curtis, Rest F., Cambridgeport, "
Bell, S. N., Manchester, N. H.	Cutting, H. A., Lunenburg, Vt.
Bemis, S. A., Hart's Location, N. H.	Davis, Emory C., Northampton, Ms.
Benton, E. R., Brookline, Mass.	Dimmock, George, Cambridge, "
Bigelow, E. B., Boston, "	Dolbear, A. E., College Hill, "
Burbank, L. S., Woburn, "	Edmands, J. Rayner, Boston, "
Burgess, Edward, Boston, "	Ellis, Mrs. Grace A., " "
Chase, R. Stuart, Haverhill, Mass.	Emerson, George B., " "
Cheney, Mrs. E. D., Jamaica Pl. "	Emery, George E., Exeter, N. H.
Cheney, Miss M. S., " "	Fay, Charles E., College Hill, Mass.

Fenollosa, W. S., Salem, Mass.	Murdoch, John, Cambridge, Mass.
Folsom, Charles W., Cambridge, Ms.	Niles, William H., " "
Fox, Gustavus V., Boston, Mass.	Nowell, Mrs. H. P., Malden, "
Gorham, James W., " "	Nowell, W. G., " "
Greenleaf, Robert W., Camb'ge, Ms.	Odell, Lory, Portsmouth, N. H.
Hale, George S., Boston, Mass.	Palmer, Frederic N., Boston, Mass.
Hawes, George W., New Haven, Ct.	Parker, Wilbur B., " "
Hayes, S. Dana, Boston, Mass.	Pickering, Edward C., " "
Henck, J. B., Jr., " "	Pickering, William H., " "
Hill, Howard F., Ashland, N. H.	Pitman, S. Minot, College Hill, "
Hitchcock, C. H., Hanover, "	Pollard, D. Frederic, Boston, "
Holden, Luther L., Boston, Mass.	Pourtales, L. F., Cambridge, "
Holman, S. W., Framingham, Mass.	Pumpelly, Raphael, " "
Hopkins, S. C., Boston, Mass.	Quimby, E. T., Hanover, N. H.
Horsford, B., Springfield, "	Rand, Edward A., So. Boston, Mass.
Hunt, T. Sterry, Boston, "	Rogers, William B., Boston, "
Huntington, J. H., Georgetown, Ms.	Rohé, George H., " "
Hyatt, Alpheus, Cambridge, Mass.	Saunders, Charles G., Lawrence, "
Iasigi, Albert W., Boston, "	Scott, A. E., Lexington, "
Jacques, William W., Newburyport.	Scudder, Samuel H., Cambridge, Ms.
James, Thomas P., Cambridge, Ms.	Shaler, N. S., " "
Jenney, Walter, So. Boston, "	Sparks, Mrs. Jared, " "
Kendall, Mrs. Phebe M., Camb'ge.	Spaulding, H. G., Dorchester, "
Kimball, Benjamin, Boston, Mass.	Sweetser, M. F., Boston, "
Kingman, A. A., Brookline, "	Tuttle, C. W., " "
Kingman, Mrs. A. A., " "	Upham, Warren, Nashua, N. H.
Kneeland, Samuel, Boston, "	Vogl, Mrs. Susie C., Boston, Mass.
Lamson, C. D., " "	Vose, George L., Brunswick, Me.
Lanza, Gaetano, " "	Walling, H. F., Cambridge, Mass.
Little, William, Manchester, N. H.	Walling, Mrs. Maria F., " "
Littlehale, Miss Helen P., Boston.	Wells, Samuel, Boston, "
Littlehale, Miss Mary F., " "	Wells, Webster, " "
Lowery, Woodbury, Cambridge, Ms.	Wilbur, George H., Linden, "
Mann, B. Pickman, " "	Williams, Francis H., Boston, "
Mann, George C., " "	Wilson, J. M., Charlestown, "
Merriman, Daniel, Boston, Mass.	Woodbury, C. L., Boston, "
Morse, Edward S., Salem, "	Worcester, Mrs. E. C., Newtonville.
Morse, George F., Portland, Me.	Worcester, John, " "

Nomenclature of the White Mountains.

Report of the Committee on Nomenclature, presented April 12, 1876.

The necessity of a brief and distinctive system of nomenclature will be apparent to any one who may attempt to prepare any detailed description or map of the mountains. According to the present system many mountains have several names (each), while the same name is often applied to several mountains. For instance, Mt. Paugus is also known as Bald Mt., Moose Mt., Ragged Mt., Deer Mt., Hunchback, Middle Mt., and Frog Mt.; while there are numerous Black Mts. in New Hampshire alone, in the townships of Conway, Ossipee, Sandwich, Jackson, Benton (two), Kilkenny, Carlisle, and the Pemigewasset Forest.

Even if each prominent peak had a separate name, the smaller points would still be unprovided for; and if names were given to these, the trouble would be yet further increased, owing to the difficulty of finding or remembering the summits to which they belong.

After careful consideration the following plan has been adopted. The whole mountain-district has been divided into a number of sections, each of which is designated by a capital letter. The various mountains in each section are then numbered, and the separate summits of each mountain are denoted by a second number. To prevent any two sections from including the same mountain, the divisions should be along the rivers and notches, or, what is often more easily recognized and yet is practically the same, along the railroads. The entire State has been divided into twenty-six sections, which are lettered from "A" on the north and west toward the south and east. The same rule is in general adopted for the numbers, though precedence is here sometimes given to the more prominent points. The lakes and other objects may be designated by small letters annexed to the section-letter. Accompanying this report are a list of the proposed boundaries of the sections, and a map of the White Mountain region upon which these divisions are marked.

Your Committee do not recommend that these names should be introduced to the exclusion of those now in use, since this would be quite impossible, even were it desirable. But they believe that in any accurate scientific work among the mountains some such notation will be found indispensable, and they hope that the plan here suggested will be adopted as it stands, or, if changes are desirable, that they be made now, so as to avoid the inextricable confusion of two such systems applied to the same mountain ranges. They would recommend the use of this notation in field-books, maps, and profiles; and its addition in brackets to any other designations, wherever ambiguity is to be feared.

The advantages claimed are: that the names are brief, distinctive, more easily found from a list or map, and that the system is capable of indefinite extension as it becomes desirable to study the minuter details.

As examples of their use we may say that "L. 1. 3" is certainly briefer and more distinctive than "the third summit north of the uppermost summit of the Giant's Stairs"; or "Q. 1. 4" than "the fourth summit of the ridge running north from the peak of Chocorua." Again, "Z. b." is certainly more convenient for our note-books, though possibly less suggestive and inspiring, than the historic Indian name of Lake Chargoggagoggmanchoggagogg.

The boundaries of the sections into which the State is divided are as follows:—

A. Canada, Maine, Lake Umbagog, Androscoggin River, Clear Stream River, Dixville Notch, Mohawk River, Connecticut River, Hall's Stream. Or, by Canada, Maine, B and Vermont.

B. Mohawk River, Dixville Notch, Clear Stream River, Androscoggin River, Dead River, Grand Trunk R. R., Upper Ammonoosuc River, Connecticut River. Or, by A, C, D and Vermont.

C. Lake Umbagog, Maine, Androscoggin River. Or, by Maine, H, G, F, D and B.

D. Upper Ammonoosuc River, Grand Trunk R. R., Dead

River, Androscoggin River, Moose River, Israel River, Connecticut River. Or, by B, C, F, E and Vermont.

E. Israel River, Lancaster Path, Ammonoosuc River, south of Mt. Agassiz, S. Br. of Ammonoosuc River, Ammonoosuc River, Connecticut River. Or, by D, F, K, J, I and Vermont.

F. Moose River, Androscoggin River, Peabody River, south of Boott's Spur, Mt. Washington River, Saco River, Portland & Ogdensburg R. R., Ammonoosuc River, Lancaster Path, Israel River. Or, by D, C, G, M, L and K.

G. Androscoggin River, Wild River, Perkins Notch, Carter's Notch, Peabody River. Or, by C, H, M and F.

H. Maine, Mountain Pond, East Branch of Saco River, Wild River. Or, by Maine, P, M and G.

I. Ammonoosuc River, South Br. of Ammonoosuc River, Franconia Notch, Pemigewasset River, Baker's River, Boston, Concord & Montreal R. R., Oliverian Brook, Connecticut River. Or, by E, J, N, Q, S and Vermont.

J. Ammonoosuc River, New Zealand River, East Br. of Pemigewasset River, Pemigewasset River, Franconia Notch, South Br. of Ammonoosuc River, south of Mt. Agassiz. Or, by E, K, N and I.

K. Ammonoosuc River, Portland & Ogdensburg R. R., Saco River, Sawyer's River, Hancock Notch, Cedar Brook, East Br. of Pemigewasset River, Outlet of New Zealand Pond, New Zealand River. Or, by E, F, L, O, N and J.

L. Ellis River, Saco River, Mt. Washington River, South of Boott's Spur. Or, by F, M, O and K.

M. Carter's Notch, Great Bog, East Br. of Saco River, Saco River, Ellis River, and Peabody River. Or, by G, H, P, O, L and F.

N. East Br. of Pemigewasset River, Cedar Brook, Hancock Notch, Sawyer's River, Mad River, Pemigewasset River. Or, by K, O, Q, I and J.

O. Saco River, Swift River, Sawyer's River. Or, by K, L, P, Q and N.

P. Mountain Pond, Maine, Saco River, East Br. of Saco River. Or, by H, Maine, R, O and M.

Q. Swift River, Great Falls R. R., outlet of Bear Camp Pond, Squam Lake, Squam River, Pemigewasset River, Mad River. Or, by O, R, T, S, I and N.

R. Saco River, Maine, Cocheco River, Dover & Weirs R. R., Lake Winnipisauke, Squam Lake, outlet of Bear Camp Pond, Ossipee Lake, Great Falls R. R. Or, by Q, P, Maine, X, W and T.

S. Oliverian Brook, Boston, Concord & Montreal R. R., Baker's River, Pemigewasset River, Northern R. R., Connecticut River. Or, by I, Q, T, V, U and Vermont.

T. Squam Lake, Lake Winnipisauke, Great Bay, Merrimack River, Pemigewasset River. Or, by Q, R, W, V and S.

U. Northern R. R., Lake Sunapee, Concord & Claremont R. R., Sugar River, Connecticut River. Or, by S, V, Y and Vermont.

V. Northern R. R., Pemigewasset River, Contoocook River, Concord & Claremont R. R., Lake Sunapee. Or, by S, T, W, Z, Y and U.

W. Great Bay, Lake Winnipisauke, Dover & Weirs R. R., Cocheco River, Suncook River, Merrimack River. Or, by R, X, Z, V and T.

X. Suncook River, Cocheco River, Maine, Ocean, Massachusetts, Merrimack River. Or, by W, Maine, Ocean, Massachusetts and Z.

Y. Sugar River, Concord & Claremont R. R., Contoocook River, Monadnock R. R., Massachusetts and Connecticut River. Or, by U, V, Z, Massachusetts and Vermont.

Z. Merrimack River, Massachusetts, Monadnock R. R., Contoocook River. Or, by W, X, Massachusetts, Y and V.

The following names, some of which have already been used by Prof. Hitchcock in his report on the Geology of New Hampshire, are proposed for unnamed or doubtful summits in New Hampshire: — Mt. Field for the highest summit of the Willey Range; Mt. Hale for the highest summit of the range between the Willey and Twin Ranges; Mts. Lowell and Anderson for the first and second summits east of Carrigain Notch; Mt. Dartmouth for the summit between Mt. Deception and Mitten Mt.; the Sugar Loaves for the three lower summits north of Mt.

Hale; Cape Horn to remain in place of Mt. Lyon, proposed in the Geological Report; Mt. Weetamoo for the mountain near Campton which has lately been called by that name; Mt. Watanomee for the mountain recently so named near Woodstock; Mt. Langdon in place of Mt. Blackwell near Upper Bartlett; Carter Dome for the mountain on the north side of Carter Notch; Mt. Wildcat for the one on the south of the notch; Mt. Carter for the triple summit between Carter Dome and the Imp; Mt. Paugus for the summit between Mts. Chocorua and Passaconaway; Mt. Wanalancet for the mountain south of Mt. Paugus; Melvin Peak for the highest point in the Ossipee Range; Whittier Peak for the rocky summit near S. Tamworth; Mt. Kancamagus for the mountain east of Mt. Osceola; Mt. Attitash for the low summit north of Moat Mt.; Mt. Bond for the southernmost summit of the Twin Range; Mt. Guyot for the summit next north of Mt. Bond; Vose's Spur for the easterly spur of Mt. Carrigain.

Members visiting the mountains will do a service to the Club by collecting all available information with regard to the names of mountains, streams, &c., and the authorities for such names.

The Atlantic System of Mountains (Abstract).

BY PROF. C. H. HITCHCOCK.

Read March 8, 1876.

The Atlantic System includes the mountains and high lands bordering the Atlantic Ocean between Newfoundland and the Carolinas. It may be divided into three sections.

1. The Terranovan, confined to Newfoundland, and a branch in Nova Scotia, whose culminating point may be 1500 feet high.

2. The Montalban, with Green Mt. branch, culminating in the White Mts. at a height of 6293 feet. This section is nearly encircled by tide-water, following the St. Lawrence River, Lake Champlain, and the Hudson River.

3. The Carolina, or Southern, which culminates in the Black Mts. at a height of 6700 feet.

The distinguishing characteristics of the Atlantic System are short sharp ridges, with irregular obtusely pointed summit lines arranged *en échelon*. They reach the height of 6700 feet. The materials are mostly the Eozoic gneisses, but include some Cambrian rocks along the western border from the Green Mts. to the Blue Ridge and Black Mts. The distinguishing features are not purely geological, therefore, but the geological structure has determined its peculiarities. The dips are usually inverted. The system was elevated principally at the close of the Eozoic Age.

In contrast to these, the distinguishing features of the Appalachian System are long and narrow ridges, with summits so level that there may be no gap for a hundred miles. At the northern end they curve into loops, while at the southern end the system terminates in pairs of straight ridges, cut off short by faults. The geological constituents are of Paleozoic age, and the upheaval was at the close of Paleozoic time. The strata are disposed in normal and symmetrical folds, with occasionally a table-land. The usual height is about 1000 feet.

The two systems are separated through their entire length by the great Appalachian Valley, which includes the valleys of the St. Lawrence River, Lake Champlain, Hudson, Kittatinny and Shenandoah Rivers, the Great Valley of Virginia, East Tennessee, &c. The two systems are in all the above particulars similar to the Alps and Jura Mts. of Switzerland, which are likewise separated by a great valley.

History of the Atlantic System.

1. The *rocks* of the system, also called the Atlantic System, were deposited in a Laurentian basin, with the Adirondacks on the west, and a nearly obliterated barrier, recognizable in the ancient gneisses of eastern Massachusetts, on the east.

2. After this deposition there was an elevation, giving rise to the Franconia breccia in New Hampshire.

3. A further elevation took place at the close of the Cambrian Age, when the Green Mts. were greatly elevated, and

the Pemigewasset granites poured out in New Hampshire. The Green Mts. were made still more prominent at the close of the Cambro-Silurian Age.

4. The northern parts were submerged to form the Gulf of St. Lawrence.

5. A reëlevation took place in the Devonian Age, which was the last consequential movement among the White Mts., and of which a record is afforded by the strata seen in subordinate curves on the carriage road up Mt. Washington.

6. There was an elevation in Mesozoic time, which allowed a broad strip from Fortress Monroe to Newfoundland, now submerged, to appear out of water. This ancient elevation placed the site of New York City at least 1000 feet above its present level. This is shown (*a*) by the existence of a fresh water lake in cretaceous times stretching from the eastern end of Long Island beyond Philadelphia, (*b*) by the channel of Hudson River extending at the present time 80 miles out to sea, as shown by soundings, (*c*) by the shallow water for 100 miles or more off the coast, indicated by shoals. These shoals are probably composed of Tertiary rocks, and thus the Cenozoic border to the Atlantic rocks would be of uniform width the whole length of the mountain system.

7. In the Champlain period the northern parts of the continent were depressed 600 feet, thus making the Great Lakes empty through the St. Lawrence instead of through the Hudson River, while the Hudson valley itself was depressed to the sea level, causing much of the Atlantic System of Mountains to disappear. The mountain mass is, however, still apparent, when we take into account, as authorized by physical geographers, that part of the ocean bed within 600 feet of the present surface.

A knowledge of the mutations of the surface of the Atlantic region is therefore necessary to enable us to understand the position of this earth-mass, especially to realize that it forms an extensive mountain range, though partially submerged beneath the ocean. Most of these oscillations were over before the Appalachians came into existence. The Atlantic Mts. in fact furnished the materials out of which the Appalachians were formed.

For all these reasons the author insists on the importance of employing the great Appalachian Valley as the boundary between the Atlantic and Appalachian mountain systems.

A Day on Tripyramid.

BY PROF. CHARLES E. FAY.

Read March 8, 1876.

In presenting this paper, which is to recount a day's experience in the southerly section of the White Mountain region, I have two reasons for self-congratulation. First, that I am to read it to an audience composed in so large part of enthusiasts on the subject of mountain exploration, and with regard to whom I may be sure that, if the communication do not prove interesting in itself, it will inevitably serve as the key-note to a train of memories that will be ; and again, that the mountain in the tour of which that day was passed, standing remote from the ordinary lines of travel, yet visible from many points in its distant solitude, has, until recently, never been visited by the curious, has been traversed completely, so far as I know, by no other party than our own, and, moreover, is remarkable for having been the theatre of the most startling exhibitions of the mighty power of Nature's forces that has been witnessed among these mountains, it may be since they were first heaved above the world-embracing deep. I have to regret that I took no notes, which will account for the too frequent recurrence of "about," "some," and "perhaps."

Tripyramid, or the "Waterville Haystacks," as the range has sometimes been called (resembling, however, that type of bucolic architecture as little and in the same way as the great Haystacks of the Franconia system), stands in the southern limits of the woody wilderness that stretches from Greeley's in Waterville to the Ammonoosuc valley. By tourists who follow ordinary lines of travel, it is, perhaps, seen to the best advantage, as they pass through the township of Campton in going up or down the valley of the Pemigewassett. Here the hills recede on the east, marking the course of the pretty Mad River

valley. Directly eastward, and some eight miles away, stands the form, at once grand and graceful, of Black Mt. (4000 feet high). On the northerly and, higher up, westerly side of the same valley lies the group of mountains, nameless, I believe, as a system, having Welch as its southernmost outpost, and culminating in Tecumseh — seen from this standpoint as a sharp tooth against the sky, and also some four thousand feet in height. Between these two groups, in the northeast, filling some degrees of the otherwise open, more distant horizon, above a range of wooded hills immediately at its foot, and which seems to form a part of it, rises the symmetrical range of Tripyramid — clothed to the apex of each of its three members completely in its closely woven garment of dark spruces, save where it is rent from top to bottom by the great land-slide of 1869. A far less satisfactory view of the obverse side may be had from high land in Bartlett. The southern peak is visible from the cars on the Boston, Concord & Montreal Railroad, as they skirt the bay below Laconia, distinguishable by the shining line of the slide, and indeed I am told that it may be recognized by that token from hilltops as far south as Manchester.

For several successive years my companion and myself had been content to enjoy Tripyramid from a distance, but having at length been seized with a decided attack of what a European climber has called the "*cacoethes scandendi*," and having made ourselves familiar with the other peaks and ranges in view, we determined to unveil its mysteries, to ascend the path of the slide to the summit of the south mountain, and, passing along the ridge over the intermediate spire, find out on what the remoter northern peak was looking down so calmly. When an appropriate day offered we found two other gentlemen, novices as yet in mountain excursions, but, as the sequel showed, of good fibre, who were ready to undertake the enterprise with us. And thus one moderately clear morning in August, 1874, we set out from Campton Village at a little after six o'clock, behind a stout farm horse that should carry us to Greeley's Hotel, twelve miles distant. For the first six miles we drove with our goal in full sight, the slide gradually grow-

ing more and more bright as the sun rose higher and the long shadows of the trees on its eastern edge no longer fell across its cream-white surface, but for the remainder of the way it was hidden by the intervening range of hills. We reached Mr. Greeley's hostelry — the *ultima thule* of civilization and travelled roads in this direction — at half past eight, gave our rustic conveyance into the hands of the hostler, and prepared ourselves in marching order.

For some distance the course followed is the same as in visiting the picturesque cascades to which the majority of visitors to this sequestered region duly make pilgrimage. Across the rough, swampy upland pasture for a half mile to the edge of the woods, and then by a good path for a long mile into them. We had been told that our path branched off at a certain blazed tree some rods this side of the cascades. We readily found the tree, but not so readily the path. All our instincts bade us seek it on our right, and we beat the thicket on that side, but to no purpose. Could we be mistaken in the tree? On examination we found written upon it: "To the Slide!" An appeal to the sun, substantiating the evidence of a very reliable pocket-compass, for it required more than one witness to confound our prejudiced senses, convinced us that in the opposite direction lay our pathway, and a moment's search revealed it. Crossing the cascade brook on stepping stones we followed the blazed track through the woods for a short half mile farther, and found ourselves on the edge of quite a meadow and clearing — the intervale of the lower course of that tributary branch of the Mad River which comes down between the south mountain and the wooded ridge already mentioned. In visiting the slide one has to make a long detour around this ridge. A large fraction of the distance could be saved and the journey made much less fatiguing if a good path were laid out directly over it.

There is, however, one decided advantage in the longer route. From the point we had now attained our path lay along the stream, which from here onward to the foot of the south peak is a continual witness of the destructiveness of the great land-slip, and the floods that accompanied and doubtless caused it. The distance can hardly be less than two miles, yet even

here one sees masses of dead spruces, beds of gravel and boulders, that doubtless were borne down in the hurly-burly of that autumn night.

Though somewhat broad at the point where the path first comes upon this stream, the valley soon narrows and becomes little more than a ravine. For a long distance one goes picking his way among the boulders, now following this, now that, of the two or three irregular strands into which the brook has been divided by the *débris*.

Not very far below the foot of the slide proper, one comes upon one of the most remarkable features of the region. I refer to the **V**, as it has been called. Here, for a distance of some forty rods, the now much narrowed brook flows rapidly along in the apex of the angle made by the two sharply inclined sides of the ravine. The one on the right, rough and irregular, exposing the edges of broken strata, rises for about twenty feet at an angle of 60° from the horizon. The other side is a smooth strip of ledge some sixty or seventy feet wide, rising to the ragged edge of the tangled forest at an angle of about 40° . Even this slope is too great to be traversed with ease, save bare-foot, and unless one be willing to make this sacrifice, he is obliged either to walk along the edge of the brook, supporting himself by his alpenstock against the steeper wall, or take to the inhospitable woods above. Now what has swept away the belt of earth and the forest growth upon it so completely from this smooth expanse of ledge? No ordinary freshet of the little brook could have done it. Is not this also a part of the destructive work of the great land slide?

Onward yet a little way in the bed of the stream, and we came to the intersection of the main line of the slide and the brook's course. At this point the avalanche of earth, rock and tree, first found an impediment to its course, and, as one would say, was turned aside at almost a right angle.

I know of no one who visited the scene immediately subsequent to the land-slide, nor have I heard the opinion of any of the scientific gentlemen who have more recently visited it, nor did it at the time of my own visit suggest itself to me to see what evidences still remained that would throw light upon the

modus operandi of the phenomenon. But would it be possible for a mass of matter descending with great momentum into a ravine to be deflected at so sharp an angle? The slide occurred at the time of very severe rains. Is it not more probable that the mass formed a loosely constructed dam in the valley, and that the reservoir formed by the rapid accumulation of the waters of what then must have been a torrent, finally burst this impediment, bearing it in its destruction anew down the valley in a direction at right angles to the original line of descent? I trust we may hear on this subject from those whose line of investigation leads them to study these phenomena of nature, and also as to what was probably the initial point of motion in the sliding mass, whether at the bottom, or top, or at some intermediate point.

Standing at this point one is in a fine position to comprehend the extent of the mass that on that rainy night slipped its century-long moorings. Facing northeasterly one looks up a broad avenue, if I may be allowed the comparison, cut through the wilderness of evergreen trees, of creamy-white gravel intermixed with rough stones of every size of the same color. As yet the influence of the weather has not made itself felt on this fresh surface. The comparison of an avenue fails, however, if we more closely regard the figure of the barren tract. The whole distance from top to bottom must be between half and three-quarters of a mile; the widest part has a breadth of forty rods. This is at a point about quarter way up. From a base line drawn across at this point, the sides converge gradually upward, forming with it a triangular figure whose upper angle is of about 20° . The sides, however, do not come to complete convergency, the upper boundary having a breadth of twenty or thirty feet. From the same line of greatest width downward the sides again begin to converge, forming a trapezoidal figure with the base of the slide, which is in the neighborhood of thirty rods wide. Save the greatest breadth (40 rods) these figures are merely estimates, nevertheless I think not far from the truth. Assuming the minimum in each case as correct, some twenty-four acres of the mountain side with its added tons of forest, must have descended into the ravine — a

surface more than half that of Boston Common. How thoroughly the work was done is testified by the fact that, as far as I saw, not a single trunk or branch of a tree, or even a patch of the original vegetable mould appears on all this surface.

We had reached this point after numerous brief halts, at half past ten o'clock. At quarter to eleven we attacked the acclivity. Not as in the ascent of many mountains does one here have to regret time and strength lost by having to surmount a knoll merely to descend on the other side and begin anew, nor is one subjected to the disappointment of attaining some pseudo-summit only to find the true one still beyond. The top of the slide, which is but a few hundred feet below the summit of the peak, is constantly in view up a slope inclined in one place at full 45° , and usually at nearly 35° . The footing is treacherous, large stones being continually loosened and rolling down in one's wake, so that we found it advisable to choose different paths.

We were quite surprised to find how high we had ascended before we came in sight of our head-quarters at Campton, over the intermediate ridge, proving that however extensive the slide may seem from the valley of the Pemigewasset, only about two-thirds of the length of this section is really visible.

In scrutinizing the slide from that distance we had frequently remarked a large patch of a lighter shade than the rest, somewhat more than half way up the portion in view. On attaining this point we found that here the granite ledge was laid quite bare, and as this is just the steepest portion of the ascent, it was some little tax on one's powers as a climber to traverse it. At its upper extremity we made a long halt, and beside the æsthetic enjoyment of the lovely prospect, we indulged in the boyish pastime of disengaging small boulders and sending them leaping and ricocheting down the incline. At noon we found ourselves at the head of the slide. A few minutes more among the trees and tangle of the underbrush and we stood upon the summit, 4100 feet above the sea. As we anticipated, we found it covered with a dense forest growth, and we were debtors to some party that had preceded us for what of view we obtained. They had kindly cut away the trees for a little

space on the southeasterly side, granting a good outlook in this quarter.

To say that the view is extensive, fine, beautiful, superb even, would probably be no exaggeration. Is there a pinnacle four thousand feet above the sea from which one could gaze and not say as much? Still, merely for the view, one would hardly recommend a person to make the ascent of the south peak, so long as the matchless prospect from Black Mt. may be had with less effort. But no one who has the strength for it should visit the slide without enjoying the peculiar experience of its ascent, and then, of course he would not think of returning without pushing on a few minutes farther to the summit. It offers a fine standpoint from which to study the northern configuration of Black Mt., also of Whiteface and Passaconaway.

After our lunch and noon rest we proceeded to our pioneer work — to make our way through the wilderness to the north peak, perhaps a mile and a half distant. But such a mile and a half!

Those whose acquaintance with the forest has been made on lower and more civilized levels, have a very inadequate conception of what the word may mean when transported a few thousand feet above the sea on a New Hampshire hill. It is not enough that you have to burst your way with bowed head through the irritating screen of dwarf spruces, or even to assimilate yourself to the indigenous bear, hedgehog, and even serpent, and crawl or writhe humbly under them, content to escape the whip of their insolent, fretful branches, but you must make your way among trees of honest size that rise from treacherous foundations, where the plausible, thick mosses artfully conceal the interstices of the rocks, into which the incautious pedestrian plunges, now ankle, now knee deep, or even, as we have sometimes experienced it, so that a whole limb parts company with its competitor, and you stand transfixed like an ungraceful ballet-dancer. Such was the character of the region through which we now began to make our way.

Crossing the woody area of the south summit we directly came in full view of its neighbor, the central and highest of the

trio. There it rose dark and forbidding, in shape like the upper part of a sugar loaf, just across a ravine two hundred feet deep. Cautioning each other to beware of sprained ankles and worse, we began to descend the precipitous northern side of our peak, holding on by the trunks of small trees, yet now and then taking a generous step, and soon we had reached the yoke that connected the two, anon had crossed it, and commenced the ascent of the other slope.

As we began to approach its precipitous summit a new source of emotion was opened to us. We knew that we were invading a region sacred from time immemorial to the shaggy friend of solitude, *Ursus americanus*. As we made our way in single file along the steep — and directly at the summit the crest is so narrow that two persons can hardly walk abreast through the small trees with which it is beset — we thought we discovered traces of the recent proximity of *Ursus*. We agreed to unite in one astounding yell in case we should intrude upon his privacy, that should give him a worse idea of human nature than had his imaginary European cousin, Heine's misanthropic Atta Troll, and without doubt send him careering down his native mountain side with a velocity equal to that with which our desire would fain bear us in a contrary direction. That excitement and expenditure of breath we were spared.

Indeed one of the noteworthy circumstances of that day's excursion was the apparent utter absence of all animal life. We all remarked it. Not the sound of a broken branch or rustling leaf as some timid animal made its way from our path, not the note of a bird, not the hum of an insect. Something like an absolute silence seemed to reign about us, as if all nature stood in mute despair to see one more of her solitary retreats invaded by human curiosity.

We obtained no view of any consequence from this peak, though it is the highest by about a hundred feet. The small growth formed a dense screen and the trees were not large enough to scale.

Again we descended to the level of the crest that connects the three peaks with each other. The distance from the mid-

dle to the northernmost is much greater than that between the other two, and the rise is much more gradual. For quite a long stretch we found comparatively good walking. The crest here has considerable width and is level right and left. The trees border but do not infringe upon this portion, and one makes his way rapidly through the tall ferns and the bright green of other delicate plant life. Towards the end, however, the north peak showed its kinship with the others.

At three o'clock we found out on what it was looking down so calmly. To unveil the secret, however, we were obliged to climb a withered tree on the easterly side of the summit. The view was far more enchanting than that from the south peak, at least it had the charm of greater novelty. And why should not this peak seem more restful than its fellows? It catches but the faintest glimpse of the civilization of restless, anxious, careful humanity. It gazes down upon the unbroken wilderness of evergreen stretching northward far as the eye can reach, and is lulled by the "hush" of their murmuring. It looks upon that Prince of the Wilderness, Mount Carrigain, and, with it and Osceola, worships, looking northward to the throne of the Great Spirit on cloud-capped Agioochook. And then that gem upon its train, the peep eastward into the pretty upper valley of the Swift River, where it flows brightly, yet silently, along through the green meadows of its interval! I scarcely know a more lovely picture.

But soon it was time to think of our descent. We did not propose to retrace our steps, but, taking a course by our compass, strike directly for the lower part of the stream we had followed up in the forenoon. Inspired by the accomplishment of our purpose, we struck out gaily on a southwest course, and much more rapidly than less highly stimulated prudence would dictate. Who is the patron of somnambulists, inebriates and reckless mountaineers? Certainly we owed a victim on his altar for the damage we were spared in that headlong descent! Here one would leap six or eight feet down a steep rock, holding on, indeed, by a sapling, but little knowing on what his feet were to alight; then another would lose his foothold, and go sliding, with many a remonstrance, some rods down the steep

slope among the underbrush until some tree afforded a temporary mooring. By the time we began to grow a little weary of the trees and treacherous footing, we came unexpectedly upon the little rocky slide, or dry bed of a torrent, that one can just discover from Campton, a faint narrow stripe on the northwestern spur. We continued down this until it became thoroughly identified with the forest and then resumed our southwesterly course. In due season we intersected the brook some distance below the V, and from this point retracing our morning's course with rapid steps, reached Greeley's at about half past four and Campton Village at about half past six, or little more than twelve hours from our time of starting.

A few days later we met Mr. Greeley driving the red wagon, and delayed him to recount this story in an abbreviated form. What Mr. Greeley does not know about this region is generally considered as being unworthy of any inquiry. Looking down upon us with something which we interpreted as admiration, he said: "You are probably the first persons that ever stood on that north peak." We feel confident that Mr. Greeley meant what he said. We find ourselves therefore forced to a conclusion similar to that adopted by certain argumentative theologians not so very long ago, when they opposed the "testimony of the rocks," and said that it was as easy to create fossils ready made in rocks as it was to make rocks themselves; and until some man shall come forward and say that he did it or saw it done, we shall steadfastly maintain that a certain tree on that summit grew up with the old mark of an axe upon it. Even then we will maintain that we were the first to make the *tour* of Tripyramid.

[In illustration of the preceding paper, profiles are added of Tripyramid and its surroundings, taken from different points, mostly lying nearly north-east (Nos. 6-10) and south-west, (Nos. 1-5) of the mountain. They are all free-hand sketches, but Nos. 1-5, having been recently taken, are approximately drawn to the standard adopted by the Club, one centimetre to a degree. The notation used is the same as that employed upon the sketch map, but to avoid repetition, the general designation Q. 6 is omitted from the different peaks of Tripyramid.

No. I is a sketch from the summit of Jennings' Peak (Q. 8.2), height about 1100 metres, taken June 6, 1876, by Mr. S. H. Scudder. It is limited by Washington and Whiteface.

No. II is from the summit of Cooke's Hill, W. Campton, taken June 5, 1876, by the same; estimated height six or seven hundred metres. Tripyramid intervenes between Welch Mt. and Jennings' Peak. The summit from which the sketch was taken is not that seen from W. Campton, but a point beyond and higher than it, and separated from it by a distinct col; it is higher than Prospect Mt.; distinct names should be given to the two hills.

No. III is a similar view taken from a hill a short distance to the south and east of Cooke's Hill, above Mr. Taylor's house, June 2, 1876, by the same; the height of the spot is estimated at about 400 metres.

No. IV was taken from Avery's hill, above the Starr King View, W. Campton, June 7, 1876, by Prof. E. C. Pickering. Tripyramid lies between Welch Mt. and Sachem Peak (Q. 8.4); the spot is estimated to be about 250 metres high.

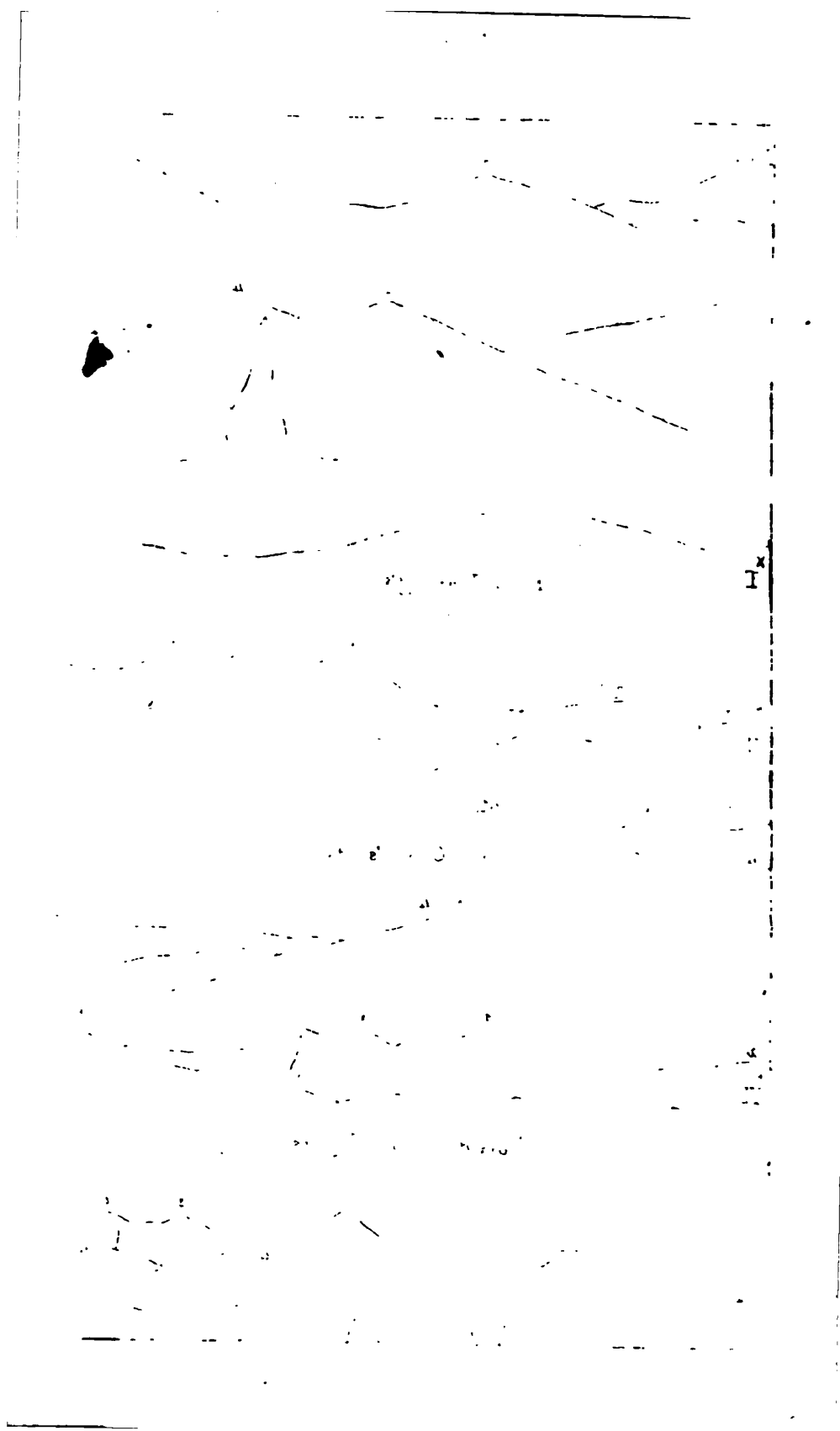
No. V is a similar sketch from the Starr King View, near the school-house, W. Campton, taken June 1, 1876, by the same; height a little over 200 metres. Tripyramid lies between Welch Mt. and Campton Hill.

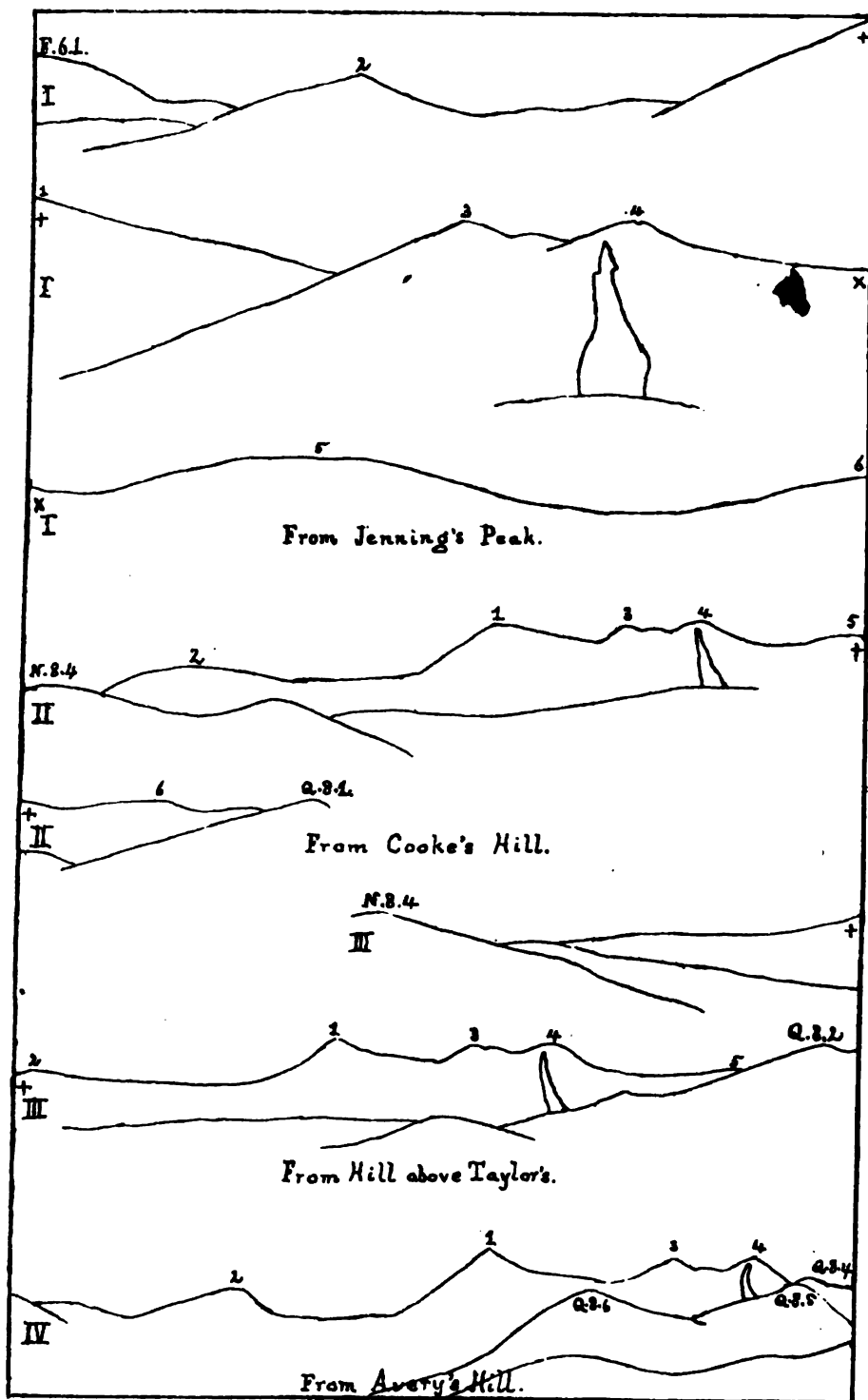
No. VI is copied from the panorama from Pleasant Mt., Me., (height about 670 metres), as given in Osgood's White Mts. Tripyramid lies between Passaconaway, on one side, and Osceola and Moat Mt. on the other.

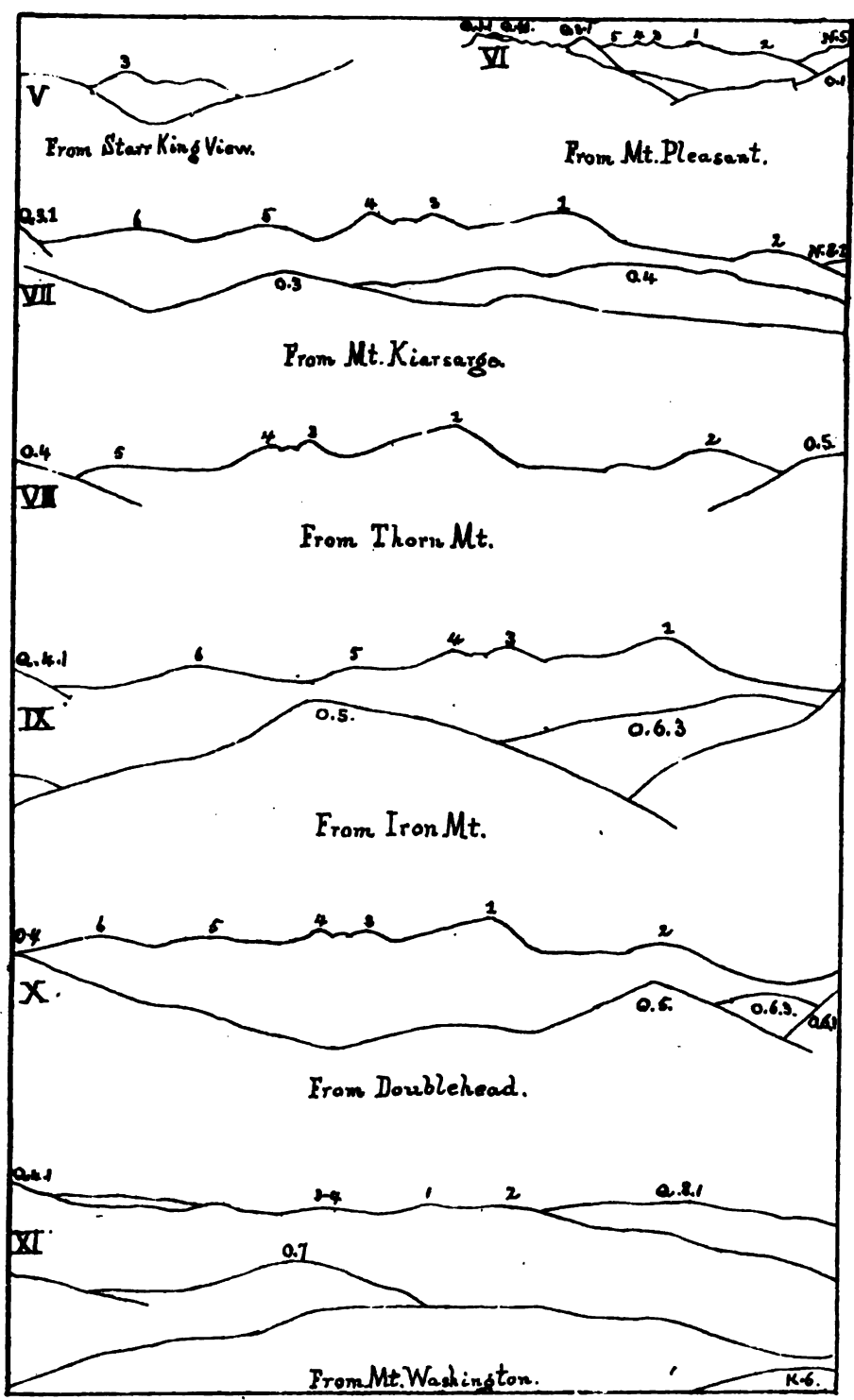
No. VII represents the view from Pequawket, or Kiarsarge (P. 1.1) 971 metres high, taken in 1875 by Prof. Pickering. The mountain intervenes between Passaconaway and Tecumseh.

No. VIII is from Thorn Mt. (M. 5.1), 700 metres high, taken in 1875 by the same. Tripyramid here lies between Table Mt. and Silver Spring.

No. IX is from Iron Mt. (L. 14), 700 metres high, taken in the same year by Prof. Pickering. Tripyramid lies between Whiteface and Tremont, and Silver Spring occupies the foreground.







[Faint, illegible handwritten notes or sketches.]

No. X is a similar view, also by Prof. Pickering, from Doublehead, 920 metres high.

No. XI is a copy of a part of the original of the panorama from Mt. Washington (1918 metres high), drawn by Mr. G. F. Morse, and given on a reduced scale in Osgood's Guide to the White Mountains. Tripyramid lies between Whiteface and Black Mt., or Sandwich Dome. — *Publishing Com.*]

Two New Forms of Mountain Barometer.

Extract from the Proceedings of March 8, 1876.

Two new forms of mountain barometer were described by Mr. S. W. Holman in behalf of Mr. Emmons. After a brief description of the principle of the mercurial barometer, and its application to the measurement of heights, a new modification of the instrument was exhibited. This form was invented by Mr. Macneill, and made by Cassella, of London. In the ordinary mountain barometer we must carry about with us a tube of nearly a yard in length, but Macneill's instrument need not be more than half this length. The tube is open at both ends, and the lower end passes by an air-tight connection through the top of a cylinder, which opens only in a tube below, connecting it with the mercury cistern. The bottom of this cistern is of soft leather, resting upon the end of a vertical screw as in the Fortin barometer, and the whole cistern, with its mercury, may be separated from the tube and carried independently, the liquid being retained by a stop-cock. To use the instrument it is hung vertically, and the screw is turned up, forcing the mercury into the cylinder above. Then the liquid rises to the level of the bottom of the open tube, the air above it is confined in the cylinder, and is then under the atmospheric pressure. Now if we continue to force up the mercury we compress the air in the cylinder, and the liquid rises to a corresponding height in the tube. This compression is continued in all measurements until the mercury in the cistern rises to a certain fixed point. The corresponding height of the mercury column in the tube, as read upon its scale, will be greater or less according as we are reading at the sea level or upon a mountain, and if the

scale has been previously graduated by comparison with an ordinary mercurial barometer at different pressures, the atmospheric pressure may be read directly from it. The error in reading this instrument is greater than in the Fortin or other barometers, and it is also liable to error from some other sources; but it is an extremely convenient form for transportation, since the mercury may be carried separately from the tube, and the whole instrument is hardly more than half the length of the shortest siphon barometer of the same range.

The second form of instrument described was a modification of the aneroid barometer. In this instrument, as ordinarily made, the motion imparted to the top of a thin metallic box by variations in the atmospheric pressure upon it, is transmitted by a train of levers to an index moving over a graduated face. A considerable error often arises from the play and spring of the levers, so that the hand does not accurately indicate the motion of the surface of the box. In the modified form, however, this motion is read directly by means of a micrometer screw, which gives it more accurately.

New Map of the White Mountains.

By J. B. HENCK, JR.

Read April 12, 1876.

Being unable to find a reliable map of the White Mountains, I made up my mind to try and make one for myself. My work was all done with a small plane-table of my own construction, the alidade being of wood, and carrying a cheap pocket telescope, provided with cross-hairs.

The plane-table was simply a piece of black walnut board about three-eighths of an inch thick, and large enough to hold a half sheet of letter paper comfortably. This was fitted with three small bolts, two at adjacent corners and one in the middle of the opposite side, by means of which three walking staves could be attached as legs.

The alidade consisted of a cherry ruler about ten inches long and an inch and a half wide, carrying at its ends two supports for the telescope. One of these supports was hollowed out on

the top for the large end of the telescope to rest on, and the other had a vertical slot cut in it, in which the eye end of the telescope moved with just sufficient friction to make it stay where it was put. This arrangement was necessary in order to point the telescope at objects either above or below the level of the eye. Both supports were hinged to the ruler, so that they could be folded down when not in use.

Arrived at the summit of a mountain, the ends of the three walking staves were fitted to their places, and the plane-table set up, taking care to make the top as nearly level as possible. A half sheet of paper was placed upon the table, and a pin driven in near each corner and one in the middle of it, the last being as nearly vertical as possible. The telescope was then focused upon some well defined object, at about the average distance of the points to be observed, and placed upon the alidade. The straight edge of the ruler was then placed in contact with the middle pin, and the alidade turned round, always resting against the pin, until one of the points to be observed was exactly bisected by the vertical hair in the telescope. Then, holding the alidade, a line was drawn by the ruler in advance of the pin, and the name of the point observed written upon it. As many other points as were desired were then observed in the same way, the name of each being written along the line corresponding to it. I also found it of great service in identifying uncertain points, to make a dot on each line to represent the point observed, putting the most distant points near the edge of the paper, and nearer ones nearer to the centre in the order of their distances. I then sketched in between these points the connecting ridges, and sometimes, also, the courses of the streams. The name of the point from which the observations were taken was then written near the centre, and the sheet detached from the table. Where the whole horizon was not visible from any one point on a mountain the plane-table was set up twice, taking care in making the second sheet to repeat several of the points observed from the first station. Generally the two points would be so close together that the two sheets could be combined and used as one without causing

any appreciable error. This operation was repeated on thirteen different summits.

In order to make a map from these observations it was necessary to know the length and direction of a line joining two of the points from which observations were taken. To determine this I drew the parallels and meridians for every 10' of latitude and longitude, by the aid of the tables for the polyconic projection given in the Coast Survey Report for 1853, and from these laid down some seven or eight points whose latitude and longitude had been determined, and some of which I had used as stations. Then placing upon one of these points the centre of the plane-table sheet made on that point, and driving a pin through the centre, the sheet was turned round until the line on it corresponding to another of the determined points, directed exactly to that point as laid down on the paper. The sheet was then fastened in this position by sticking in a couple of pins near the corners. Then a ruler was laid against the centre pin and turned until it came parallel to another of the lines on the sheet, and a line drawn by it on the map at about the right distance from the centre. A sheet taken from another of the known points was then laid on in the same way as the first, and the line on it, corresponding to the same point as that on the first sheet, was followed out with the ruler, and where these two lines crossed was the point to be determined. Generally three or four of the sheets had lines on them corresponding to the same point, and in this case all the lines were followed out so as to confirm the position found from the first pair. In this way about two hundred points were located, most of them being summits of mountains.

The accompanying map is based on these points. The streams and roads, which have been very hastily copied, and therefore are not so correct or complete as the mountains, are taken by permission of Mr. Walling, from the map of New Hampshire which is to accompany the Geological Report of Prof. Hitchcock. The present map is designed merely as a preliminary sketch to indicate the relative positions of the summits which are incorrectly given in previous charts. It will be considered a favor if any one finding serious errors or omissions will com-

municate them to the author, as material for the future map of the Club.

In conclusion I may say that all my work was accomplished on the mountains climbed for pleasure during one summer, without going out of my way for it in the least. It was rarely necessary to spend more than two hours upon a summit in order to accomplish the necessary work, and this often extended to drawing lines toward over a hundred different points. I think that for a rough survey this method possesses many advantages on account of its cheapness and the small amount of time and labor necessary.

The East Branch of the Pemigewasset.

BY WARREN UPHAM.

Read April 12, 1876.

The drainage basin of the East Branch forms part of one of the largest tracts of wilderness in New Hampshire. This includes the central and southern portions of the White Mountain region, and is wholly occupied by alternate mountains and valleys, and covered by a pathless forest. The traveller who would drive round this area by the shortest circuit of highway, must go through Sandwich Notch, Franconia Notch, Bethlehem, the White Mountain Notch, Conway and Tamworth,—a distance of one hundred and ten miles. This territory, still untraversed by roads, lies near the geographical centre of New Hampshire. The distance from Massachusetts line to the mouth of the East Branch is ninety miles, or almost exactly half the length of the State.

This stream is the first considerable tributary to the river which is almost invariably called Pemigewasset for the first fifty-two miles of its course, to Franklin, where it receives the waters from Winnipiseogee Lake; below which place it is the Merrimack, whose falls have created Manchester, Lowell, and Lawrence. This application of two different names to the same river seems to have been a trouble to Philip Carrigain, the publisher of the State Map in 1816. He gives Pemigewasset as a name for the upper portion, but places Merrimack first in prefer-

ence ; and when we come to the East Branch the name "Merimack River" is applied to it, and the stream from the north is designated as the "Middle Branch." Where they unite, nine miles south from Profile Lake, the stream of the main valley is indeed smaller than its tributary from the east. The drainage area of the former is short and narrow, being included between the Lafayette and Kinsman ranges, while the basin of the East Branch is fifteen miles long and ten miles wide. It can scarcely be considered the main stream, however, because it is not the continuance of the straight valley.

The mountains which bound the basin of the East Branch, beginning at the northwest, are the Lafayette range ; Haystack Mt. ; the Twin Mt. range, which extends south nearly to the East Branch, terminating in Mt. Bond ; the Willey Mt. range ; the range including Mts. Nancy, Anderson, Lowell, Carrigain, and Hancock ; and, on the south side of Hancock Branch, Mt. Kancamagus, and the range which curves northwest from Osceola to Loon Pond Mt.

The rocks of this region are all eruptive, being granites of several kinds, with small areas of porphyry. They are probably of Cambrian age, the date of their upheaval being after the formation of most of the White Mountain rocks.

The principal tributaries to the East Branch on the north are Franconia Branch and the outlet from New Zealand Pond ; and on the south, the outlet from Howe's Pond, Cedar Brook, which comes in from between Carrigain and Hancock Mts., and the Hancock Branch, the largest of these, which joins the East Branch about five miles above its mouth, coming from the south side of Hancock Mt. and the northern slopes of the Osceola range.

The work of lumbering has been attempted in this wilderness, and the marks of blasting may be seen where the lumbermen have tried to clear the Hancock Branch from some of its boulders for the purpose of floating logs on its spring floods, but neither this stream nor the East Branch is equal to this task. They are small streams, by no means capable of floating a log, except when in flood, and their whole course is of comparatively rapid descent and everywhere obstructed by boulders. The wood and lumber would be very valuable if it was situated in

southern New Hampshire or eastern Massachusetts ; but without a railroad, which will probably sometime be built for this purpose, it does not repay the cost of getting it to a market.

The source of the East Branch is a considerable pond at the southwest base of Mt. Willey, which has an altitude of about two thousand seven hundred feet above the sea, being some one hundred feet lower than the lowest point of water-shed between it and Saco River, on the south side of Mt. Willey. This is Ethan's Pond, named from Ethan Allen Crawford, the "giant of the mountains." It is more than one-fourth mile vertically above the Willey House, which is only some two miles distant, and residents there speak of going to the top of the mountain to fish in this pond.

One of the principal objects of interest of the upper portion of the East Branch are the falls named in honor of Thoreau, about four miles below its source, where, in a short distance, the stream falls more than one hundred and fifty feet in picturesque cascades. The foot of these falls is about two thousand one hundred feet above sea. Of other interesting cascades may be mentioned the falls on Franconia Branch, about one-third of a mile above its mouth, where, as on so many of these mountain torrents, the power of water to wear the rocks is well seen ; and the cascades on the little rivulet that descends from Loon Pond.

The height at the mouth of Franconia Branch is probably about 1200 feet, and the height of the mouth of the East Branch is, by levelling, 710 feet, or 242 feet above the Pemigewasset River at Plymouth, eighteen miles farther south. The lowest points in the watershed of the East Branch basin are, on the south, the notch at Greeley Ponds, which are tributary to Mad River, 1815 feet above sea ; and on the north, at New Zealand Pond, 2123 feet above sea, according to barometric measurement.

The work of geological exploration in this wilderness was undertaken in August, 1871, by a small party of students, under the direction of the State Geologist. A temporary camp was located about a mile up the Franconia Branch, some eight miles from Mr. Pollard's, the last house on the East Branch,

from which we transported our provisions, with blankets, an axe, the requisite hammers, &c., on our backs. I will finish with a description of two journeys taken from this camp. The first was to Mts. Bond and Guyot. Our route was north to the fork of the Franconia Branch, where the Lafayette and Redrock brooks unite. There we climbed the steep north and south ridge which lies between these brooks, being about 1500 feet above them, and separated by them and by a hollow at its north end from the surrounding higher mountain ranges. From the wooded summit of this ridge we looked east to the high south end of the Twin Mt. range, which towered temptingly above us, two or three miles distant. The day was beautiful and the air very clear, with scarcely a cloud in the sky. Here we divided our party, two continuing north to explore the ridge on which we were, and two crossing east to the south end of the Twin range. The east side of the ridge on which we were is very abrupt, but consists of broken ledges, nowhere presenting a naked wall of rock. The brook in the valley which we crossed has been called Redrock, from the ledges of red felsite, at first called jasper, which were discovered on its east side two or three miles farther north. Pebbles from this source abound in the channels of the streams as far as to the mouth of East Branch.

At starting we noticed a little open space in the valley below, and by chance our route took us to it. It was a small swampy patch of perhaps half an acre, which for some cause not very apparent was destitute of trees. This is mentioned because the forest is everywhere, with the temporary exception of burnt spots, well remembered by all who have clambered over their charred logs, and the rare places where a gale may have opened a "windfall." Such spots must be shunned, if possible, in your journey. But the highest summits often surround themselves, especially on the north or west sides, with an almost impenetrable dwarf forest, even more difficult, and which sometimes cannot be avoided by the mountain climber. This was the case with the mountain before us. In passing through or over these thickets, uprightness must be sacrificed, and one must go under,

through, or over on the stout spreading branches and tops, just as the least difficult way appears to be.

At length we came again in sight of the almost perpendicular face of rock, like some castle wall, 100 feet or so in height, at the top of the south peak on its northwest side, which we had specially noticed from the lower ridge west of Redrock brook. This precipitous ledge supplied a name for this summit during our explorations, to serve for convenience of designation till a better title should be assigned. A name afterward proposed for this point was Mt. Percival, in honor of the poet and geologist of Connecticut. Somewhat later, when the subject of nomenclature was discussed by this Club, the names Bond and Guyot were found in the list of those who had rendered service in mapping and describing the geography of these mountains. Their labors had been nearly equal, and greater in importance than those of any others in this field, and it was thought appropriate that their names should be applied to some two conspicuous summits near together, which should commemorate their work. The south end of the Twin Mt. range was the only place where two such peaks still remained without established names, and it was thought best to adopt these titles for them. Mt. Bond is the one farthest south, being the termination of the high Twin Mt. range, and this is the peak on the northwest side of which are the precipitous crags. Mt. Guyot is about three-fourths of a mile distant, being a little east of north from Mt. Bond, with an intervening hollow of about 100 feet. Both these summits are without trees, and have the characteristic arctic plants which are found in temperate regions only on bleak mountain tops; both are mainly solid ledge, with here and there small spaces of earth and alpine flowers. In the intervening hollow there are quite abundant patches of dwarf spruce, but these may be avoided in going across.

The northern summit, Mt. Guyot, is higher than Mt. Bond by about 100 feet; thence northward, the massive ridge continues nearly the same for about three miles, only slightly lower than the points known as the South and North Twin Mts., with which the range ends. The greatest depressions in this distance do not probably exceed 200 feet. As seen from Mt.

Lafayette, this long ridge appears to be very nearly of uniform height. The Twin Mts. have an altitude of 4900 feet, or 350 feet less than Lafayette, and Mts. Guyot and Bond are probably about 4800 and 4700 feet in height.

From these summits, especially from Mt. Bond, which best overlooks the East Branch valley, the prospect is extensive and grand. As far as the view extends, we see only mountains and valleys and forest. There is no appearance of any of the works of man, except that we discern the houses on the summit of Mt. Washington, fifteen miles distant. All is silent untrodden forest, and all around are the lofty foreheads of our highest mountains. The sharp crest of Lafayette is our neighbor on the west, and Mt. Willey, somewhat farther distant on the east. South of the East Branch valley, Mts. Carrigain and Hancock appear from this point of view, as rounded, massive summits, nearly alike in shape and height. The whole view shows, more completely than that from any other point, the mountain wilderness of the East Branch. A path ought to be made for ascending the Twin Mts. from Carroll, when visitors will do well to follow the high range south and see this valley from Mt. Bond.

A second journey was from the same camp to the summit of Mt. Carrigain, following the nearly straight course of the East Branch to the mouth of Cedar Brook. Thence we went up this brook a mile or so to a fork, at which place we began the ascent of the mountain. This was the northwest side, and we apprehended trouble from the usual growth of dwarf spruce, but, on the contrary, the ascent was the easiest found in all our mountain journeys. The slope is very regular, just steep enough to make one satisfied that he is fast getting towards the top, the path being through a rather open forest with no underbrush, and for the most of the way over a carpet of green moss, decked with abundance of the pink-striped *Oxalis* of our northern woods. On the northwest slope the surface is almost wholly of glacial drift, which extends to the summit where we first met outcropping ledges. The height of this mountain is by barometer 4678 feet, about 250 feet higher than Hancock Mt., which lifts its huge north and south ridge at a distance of

two or three miles to the west. Carrigain Mt., though higher, is less massive, descending steeply on all sides from the crest, which extends three-fourths of a mile to the northeast from the point reached by us, terminating in Vose's Spur. We found here trees twenty-five to thirty feet high, and so stout that one may stand with perfect security in the top of a tree, with half the body above its highest twigs, and take magnetic bearings and make sketches quite at leisure. This summit will probably soon be cleared to afford visitors a view, standing on the solid earth.

The route which I have described for climbing this mountain is that which would be taken in going up from the East Branch. Most visitors to it will start from the Saco, following Sawyer's River and Carrigain Brook, by which route the ascent and return may be accomplished in one day. Two days must be taken for a trip to either Mts. Bond and Guyot, or Mt. Carrigain, if the journey is from Pemigewasset River.

Reports of the Councillors for the Spring of 1876. Natural History.

BY DR. T. STERRY HUNT.

Read May 10, 1876.

The following suggestions, in preparing which I have been aided by other members of the Council, are thrown together simply with a view of directing the observations of those who have leisure and inclination to follow them out during the coming season.

Nature of the rocks, their mineralogical character and structure; occurrence in them of dykes or veins; the nature, size, and direction of the latter; their structure, whether jointed or banded, and their characteristic minerals. Particular attention to be paid to any uncrystalline rocks, such as sandstones, shales, or limestones which may be found; especially to those containing organic remains, as is the case with the limestone of Littleton; specimens desired. Distribution and localities of boulders

or transported stones, whether isolated or imbedded in the unstratified drift; thickness of deposits of the latter; nature of the boulders and their source. Distribution and localities of stratified clays and stratified sands, whether they rest on the old rocks or on unstratified drift, and whether they are ever found beneath the latter; also, whether they in any places contain organic remains, such as shells; if clays, whether they enclose concretions.

Observe any grooves or scratches on the rocks, and their directions; whether they conform to the valleys, or have in any region a common point of divergence, or of convergence; also, whether more than one set of scratches is to be found on any rock surface, their directions and any evidences of the relative antiquity of the intersecting scratches.

Terraces or banks of detrital material, their distribution and nature, whether of stratified or unstratified drift.

Collect material to determine the separate flora of each distinctive centre of alpine vegetation (above timber). A few points may be specified (as examples, and not as more important than others — taken from the vicinity of Mt. Washington): the nearly level exposed plateaus north of the summit of Mt. Washington; borders of the Lake of the Clouds; base of southerly cliff of Mt. Monroe; around the snow-field in Tuckerman's Ravine; the boggy source of the Fall of a Thousand Streams.

Observations on the prevailing vegetation at known heights and on different soils and exposures would be very useful. When in the forest region, a given space containing trees of average quality might be paced off, and the number of species and individuals growing on it noted, and the dimensions of a few supposed to represent an average, measured, *i. e.*, the circumference at one metre from the ground, and the height; the latter might be measured by sighting the summit, from a spot on a level with the base of the tree, along the edge of a small square piece of board, having a plumb-line attached to an angle; when the plumb-line falls on the opposite angle, the edge will be inclined at forty-five degrees; then measure the distance from the stand-point to the foot of the tree, add the height of the eye, and the result will be the height of the tree.

If there are stumps or broken trees, note the number and thickness of the annual rings, both on the north and south side of the tree. Note the prevailing shrubs and herbaceous plants, according to a similar plan, but on a smaller scale, upon the treeless heights.

Note the limit of altitude of any trees or plants.

Collect statistics of timber exported from a given territory.

Record the location of remarkable or rare trees.

Note the change and character of trees after clearing, as from evergreen to deciduous trees, or *vice versa*. Also the injurious denudation of steep mountain sides; obtain information about such places having formerly grown large timber, and being now incapable of doing so.

Lichens and fungi should be collected everywhere.

The vegetable and animal life of elevated ponds should be studied.

Diatomaceous mud, or the lacustrine deposits at the bottom of still basins or below peat bogs, should be collected; it has already been found in several localities, such as Bemis Lake, &c.

Study the exact means by which alpine flowers are fertilized; when it is done by insects, collect the species which perform this service and note the time and manner of their action.

Insects should be obtained from all regions, exactly specified as to the height of the place where taken, and their frequency on that spot; caterpillars, also, should be secured, with their food-plants and the date of their capture. Collect facts about extensive ravages of vegetation, and especially useful vegetation, by insects.

Note the highest point at which snakes, frogs, toads, and salamanders have been met with; the same, also, for fish, crustacea, worms, mollusks and insects.

Birds' nests and eggs, with their parents, should be obtained from the higher region, and especially from alpine summits, accompanied by notes on the date of capture, and the situation in which the nests were found.

Collect statistics of hunting and trapping, either from the hunters themselves, or from other residents, or from freight and stage agents. Obtain all possible information concerning

the former range of the moose, the caribou, the beaver, &c., with the date of their disappearance, and of the present comparative abundance of other large mammals — bear, deer, wildcat, &c.

Reports of the Councillors for the Spring of 1876. Topography.

BY PROF. CHARLES H. HITCHCOCK.

Read May 10, 1876.

It is proposed to undertake a survey of the White Mountain region, preparatory to the construction of an accurate topographical map on a scale of $\frac{1}{20000}$ with contour lines at intervals of every twenty metres. The horizontal position of objects must therefore be determined within at most ten metres, and elevations within five metres.

The triangulation may be divided into three parts: the primary for stations at an average distance apart of about ten kms., the secondary for distances of three or four kms., and the tertiary for distances of four or five hundred metres. It is hoped that the primary triangulation will be conducted by the Coast Survey, but if not, it must be made from the points whose position is already determined and given in Appendix *A*. A surveyor's transit reading to 30" will give sufficient precision. The points to be determined are given in Appendix *B*, and should be marked by such signals as are described in Appendix *C*.

The secondary triangulation will be effected with a surveyor's transit, or radiating plane-table (Appendix *D*), and will determine the position of the minor summits, ends of ridges, steeples, chimneys of houses, boulders, trees, fence corners, bridges, forks of streams or roads and other objects which can be readily recognized. All these objects must be fully described and sketched for identification. Houses should be denoted by the names given on the county maps.

The tertiary triangulation will be conducted by a larger plane table (Appendix *E*) and should include all objects, such as summits, ridges, depressions, ravines, slides and cols, characterizing the topography. The plane table should be used in the

usual way, its position being found by occupying secondary stations, or points near them, and measuring the distance and direction, or, when necessary, by means of the three point problem. Objects nearer than five hundred metres may be found by the telemeter (Appendix *F*), and this method has especial value in determining the shape of small ponds.

The elevation of the stations of the primary triangulation may be found by the micrometer level (Appendix *G*). Those of the secondary and tertiary stations by a surveyor's transit, by a sextant, or by the alidade of the plane table. The bench marks, from which elevations will be measured, are the points given in large figures in the Geological Report, Vol. I, pp. 257. The most important of these are given in Appendix *H*. Sections of the ground between adjacent tertiary sections should be sketched carefully in the note-book, and points of the contours then determined graphically as described in Appendix *I*. Each point must be determined by three intersecting lines, and if they do not meet within ten metres two additional check lines should be used.

Surveys of streams, paths and roads by the method of traversing, are also desired. Bearings may be taken with a pocket compass, and distances measured by chaining, pacing, or by the stadia or pedometer. Very short lines are not desirable, as it is better to run longer lines, and measure or sketch offsets. Sketches or drawings made by the camera, or even by the eye, and photographs, if well executed, will also prove of great value in preparing the map. This method, used in connection with the micrometer level and plane table (Appendix *J*), is perhaps the best for determining the form of ponds.

Profiles of the various mountain views on a scale of a degree to a centimetre, especially from all the primary stations, are greatly to be desired. The instrument described on page 61 seems best adapted to the construction of these profiles. The value of the latter will in all cases be greatly enhanced, if the exact direction, both horizontally and vertically, of at least two points is determined.

APPENDIX A. *Primary Stations Determined.*

<i>Name.</i>	<i>Latitude.</i>	<i>Longitude.</i>
Washington	44° 18' 13".22	71° 18' 13".43
Lafayette	44° 09' 37".63	71° 38' 40".96
Moosilauk	44° 01' 23".07	72° 06' 30".49
Pequawket	44° 06' 19".92	71° 05' 40".29
Whiteface	43° 56' 00".13	71° 24' 21".44
Black	43° 54' 00".51	71° 29' 54".35
Mt. Pleasant	44° 01' 35".53	70° 49' 20".96
Crown Monument	45° 18' 23".33	71° 05' 40".50
Royce	44° 20' 21"	

APPENDIX B. *Points to be Determined.*

N. Percy Peak	B.	Sugar Loaf	I.
Hayes	C.	Kinsman	I.
Hill in Shelburne	C.	Blue	I.
Forist	D.	Cooke's Hill	I.
Pilot	D. 4.1	Black	I.
South Peak	D. 6	Watanomee	I.
Starr King	D. 12	Hale	J. 1
Boy	D. 16	Bond	J. 3
Agassiz	E. 11.1	Flume	J. 8
Deception	E. 3.1	Willey	K. 4.1
Lunenburg Hts., Vt.		Carrigain	K. 9
Cherry	E. 4.1	Crawford	L. 6
Kimball Hill	E. 6.1	Davis	L. 11
Dalton	E. 7.1	Iron	L. 14
Bray's Hill	E. 9	S. Doublehead	M. 4.2
Prospect Hill	E. 10	Osceola	N. 5.2
Pine	F. 1.2	Russell	N. 7.4
Adams	F. 3.1	Fisher	N. 8.2
Jefferson	F. 4.1	Welch	N. 8.4
Pleasant	F. 9.1	N. Moat	O. 1.1
	G. 1	Table	O. 4.1
Moriah	G. 3.1	Tremont	O. 6.1
Carter Dome	G. 6.1	Green Hill	P. 2.4
Baldface	H. 1.1	Chocorua	Q. 1.1
Royce	H. 4.	Tripyramid	Q. 6.1
Cobble Hill	I.		

APPENDIX C. *Signals.*

The signal should consist of a pole not less than three or four inches in diameter, and should rise at least six feet above all surrounding objects. On the top of this pole something of larger diameter should be placed, by which the signal may be recognized from a distance. The best mark is a nail keg, which may be inverted over the end of the pole and secured by nailing through the bottom, taking care to fix the pole in the centre of the keg. A simpler and very good mark may be made by leaving a tuft of green branches at the top of the pole. In this case the signal should be made from a young fir or spruce tree having a tolerably regular top. A foot or more of the top should be cut off, then the branches left on for about a foot and a half, the ends being trimmed so as to leave them the same length all round, and the rest of the pole trimmed smooth. Another plan is to use a flag instead of the keg or tuft, but this is not so good. If a flag is used it should be in the shape of a trapezoid, the side next the pole being about eighteen inches, the opposite side about six inches, and the length about thirty inches. The side next the pole should be tacked to a light stick about twenty inches long, and a wire about a tenth of an inch in diameter should be sewed round the other three sides, the ends projecting far enough to be wound once or twice around the ends of the stick and then bent into rings. One of these rings should be small, so that it may turn easily on a large nail driven into the top of the pole, without slipping down over the pole itself. The other ring should be large enough to encircle the pole and be quite loose. The signal, if to be seen against the sky, should be black throughout, but if to be seen against a dark background, it should be white. In case of doubt it should have alternate bands of black and white. If the signal is made from a green fir or pine tree the bark may be left on for a black signal and stripped off for a white one; but if the natural color of the pole is not dark enough or not light enough, strips of black or white cloth may be wound round it. Generally the black signal will be best on high points and the white on low ones.

The base of the signal may be secured by a bolt set in the rock, setting it in the earth, piling stones around it, or lashing or nailing it to the top of a tree, according to circumstances. The pole should be truly vertical, which may be assured by sighting to it by a string with a stone at the end, from two directions at right angles to each other. It should be secured in this position by three or four braces or wire guys attached to bolts or stakes, or weighted with stones. Too much care cannot be taken to get the pole vertical, and to secure it against being blown down.

Finally, a full description of the signal should be written out, giving its form, size and color, and its position, including the name of the hill or mountain, and the distance and direction of the signal from several neighboring objects; so that if destroyed it may be replaced within a metre of its original position, the nearer the better. The position will be made still more certain if it is permanently marked by a large stake driven down even with the ground, by a drill hole or cross cut in the solid ledge, or by blazing the tree to which it is attached. The description should be mailed as soon as possible to the Councillor on Topography.

APPENDIX D. *Radiating Plane Table.*

This instrument consists of a drawing board $11'' \times 16'' \times \frac{1}{2}''$ mounted on a photographer's tripod. To this a sheet of manilla paper is attached by thumb-tacks. The alidade consists of a mahogany rule 50 centimetres long with sights hinged at the ends so that they can be folded down on the ruler. To the rear sight is attached a piece of brass with two intersecting slits, one vertical and the other horizontal. In the fore sight is a vertical wire or horse-hair and on one side is a scale of millimetres. Two levels are attached, one to the ruler, and the second, at right angles to this, to the top of the fore sight. To use this instrument, erect the instrument over the station to be occupied and attach a sheet of paper. Level the board and insert a pin near its centre, then place the ruler in contact with this pin and direct it in turn towards each point to be observed, drawing a line with a hard pencil after each setting, and writing

on it the name of the point observed. Also draw lines to three or four of the best defined primary stations. Their identification is often greatly aided by drawing a profile of the view and numbering the corresponding points and lines. Important angles should be repeated by moving the pin and drawing the lines again. Elevations may be measured by the vertical scale, looking through the horizontal slit, care being taken that the bubble is exactly in the centre.

APPENDIX E. *Ordinary Plane Table.*

The larger plane table consists of a drawing board $16'' \times 22'' \times \frac{7}{8}''$ mounted on a photographer's tripod with three levelling screws, with the same alidade as above. Each sheet will include an area of 8.3 by 11.2 kms. or about five by seven miles. All the primary and secondary stations should be accurately constructed on a scale of $\frac{1}{20000}$ and the work based entirely on them.

APPENDIX F. *Telemeter.*

The telemeter consists of two strips of wood $60'' \times 3'' \times \frac{7}{8}''$ hinged together, and divided on the faces in contact into five cms. so that the graduation can be read at a distance. When opened they may be kept in place by a sliding clamp. In the field of a small telescope is a plate of glass ruled with three equidistant parallel lines. The distance of the rod is directly determined by seeing how many divisions are included between two of the lines as seen through the telescope. The number of divisions must first be found for some known interval, after which the rule of three gives the required distance. This instrument also forms an excellent levelling rod three metres long.

APPENDIX G. *Micrometer Level.*

This instrument consists of a telescope mounted on a stand and having a scale of equal parts in its eye-piece. Levels are attached above, inclined at such angles to each other that when successively rendered horizontal the three fields of view will be nearly tangent to each other. The angular eleva-

tion of any point is determined by bringing one of the levels horizontal, and reading the height by the graduated scale. A full description of this instrument and the method of using it is given in the *Proc. Amer. Acad.*, xi, 256.

APPENDIX H. *Elevations.*

<i>Name.</i>	<i>Feet.</i>	<i>Name.</i>	<i>Feet.</i>
Washington . . .	6293	Twin Mt. Station . .	1446
Moosilauk . . .	4881	Crossing P. & O. and B.	
Lafayette . . .	5259	M. & C. R. R. . .	882
Gunstock . . .	2394	Plymouth . . .	473
Pequawket . . .	3251	Rumney . . .	520
Pleasant . . .	2021	Warren . . .	736
Whiteface . . .	4007	Warren Summit . .	1063
Sandwich Dome . .	4000	Lisbon . . .	577
Kearsarge . . .	2943	Littleton . . .	817
Monadnock . . .	3186	Wing Road Junction .	1019
Upper tank on Mt. Wash'n	5800	Whitefield . . .	931
Second tank, Jacob's ladder	5468	Dalton . . .	836
Half-way House . .	3840	Lancaster . . .	870
Waumbek Junction .	3910	Groveton . . .	901
Ammonoosuc Station .	2668	Bethlehem . . .	1187
Glen House . . .	1632	Junction P. & O. and Mt.	
Crawford House . .	1899	Wash. Br. . . .	1483
Willey House . . .	1323	State Line G. T. R. R. .	713
Fabyan House . . .	1571	Shelburne . . .	723
White Mountain House .	1556	Gorham . . .	812
Twin Mountain House .	1429	Berlin Falls . . .	1035
Madison Summit . .	516	Milan Summit . . .	1087
Conway Corner . . .	466	Milan water station .	1080
North Conway . . .	516	W. Milan . . .	1015
Jackson (road between		Stark water station .	990
bridges) . . .	759	Stark . . .	972
Goodrich Falls (road)	708	Bridge over Upper Ammon.	961
Upper Bartlett . . .	660	Stratford Hollow . .	877
Wolfeborough Junction .	574	N. Stratford . . .	915
State Line P. & O. R. R.		Island Pond, Vt. . .	1197
(highway) . . .	451		

APPENDIX I. *Contours from Sections.*

Mark on a sheet of rectangular paper the relative horizontal and vertical distances between the two points between which

the section is drawn. It is generally more convenient to double the vertical distances. Sketch in the intermediate section of the surface of the ground, and the abscissa of the point where it crosses each horizontal line gives one point of the corresponding contour. The paper should be divided into millimetres; each division will then represent twenty metres, or if the vertical scale is doubled, ten metres.

APPENDIX J. *Outlines of Ponds.*

When a pond or lake is seen from a hill-top, its form may be mapped by the following method. Draw lines on the plane table towards all the prominent points, and observe by the alidade the angular depression of each. Then, since the true depression is everywhere the same, the distance of each point will be inversely as its apparent depression, therefore the true position of each is readily determined. This method becomes inaccurate for points near the horizon, but in this case the micrometer level can be used with excellent results.

Reports of the Councillors for the Spring of 1876. Art.

BY PROF. CHARLES E. FAY.

Read May 10, 1876.

In presenting a report of what it hopes to accomplish during the coming season, the department of Art feels constrained to call the attention of the Club to its peculiar dual nature, in accordance with which it is, on the one hand, a department of simple æsthetic enjoyment, on the other, like its co-departments, a field of work.

Those familiar with the discussions of the meetings preliminary to the organization of the Club, need not be reminded of the debate which resulted in the wedding of the scientific and æsthetic elements, wherein it was felt that the former, like a strong husband, would do the laborious honor-bearing work, and the latter, as a graceful enthusiastic consort, would win many friends to the association. Hence arose a department in

the distribution of the field of activities, called, for the lack of a better name, the Department of Art. But the name doubtless has suggested another, not more practical field of labor perhaps, but one at least more like that of the other departments, one pertaining to Art in a narrower sense, embracing especially everything that may have to do with the pictorial representation of all that is grand, beautiful, or even curious in the region to explore which is the province of the Appalachian Mountain Club.

Viewing its office from either standpoint, the department has its suggestions to make.

In its original province it would urge all the fraternity to betake themselves as early as may be to the hill-country, with eyes open to receive every inspiration of beauty and grandeur that can elevate the soul and make man himself grander and more beautiful. And it would impress upon all those who feel that their only title to membership in the Club rests in the fact that they are lovers of the scenes of its activity, to remember that, in order that it may attain its highest measure of influence and carry out its plans for usefulness, the Club needs a large and enthusiastic membership, and that they should exert themselves to bring its aims, advantages, and the desirability of its membership before the minds of all who are eligible. In such efforts one may feel that he is doing legitimate work in this department.

As an especial class of individuals whom it is our duty to interest in the Club, we would name before all others the artists who make the mountain-region the field of their summer studies. The Councillor would account for his incumbency of the office on the ground that at the time of the organization of the Club there was not a single one of that fraternity in its membership. So far as he knows none has since been added. This is certainly a point wherein we are weak. New England, and Boston especially, is the home of many landscape artists, whose work among our hills is well known and appreciated. Their association with us would be, we think, a mutual benefit. That we should be the gainers needs no argument. That they would find in the Club an important addition to their

appreciative public we cannot doubt. These considerations naturally lead us to the suggestions of the department in its narrower conception.

The Club is to-day indeed in its infancy, but if a large and constant increase in its membership may be taken as a sign of its future prosperity, it is justified in making comprehensive plans,—among others for the possession of a fine illustrative art gallery. This is happily one of those things that do not arise for the wishing. If it did we should be much embarrassed to-day for a suitable place to bestow it. It is to be *collected*. The Society of Natural History has kindly offered the Club the use of one of its alcoves as a depository of books, maps and other documentary matter. Here there is a ready abiding place for anything in the way of paintings, drawings, profiles, photographs, stereoscopic views, and if there be any other form of pictorial presentment, that members of the Club would have the goodness to forward. May not the department anticipate a generous response to this suggestion? When the summer is over and we meet again in our city quarters, may we not find here many a vivid reminder of pleasant scenes and experiences in the views that various members shall have furnished? Packages addressed to the Art Department, Appalachian Mountain Club, Care of Williams & Everett, Boston, will be duly cared for.

Many of the finest views have already been transferred to paper and are easily obtainable. Many a beautiful nook is known to but a favored few, and many other scenes worthy of the pencil and a wide appreciation will be revealed in the track of the new explorations. Cannot these parties be accompanied by one or more persons skillful with the pencil, or even by amateur photographers. Here again is a place where we need the coöperation of the artist, and where he would find it of advantage to be affiliated with us.

But not only is our pleasure to be subserved by the results of your talent or generosity. This department can render itself helpful to that of Topography. To the topographer the profile of the mountain is a desideratum. Unfortunately those who will do our mapping are under the limitations of the hori-

zontal plane, and inadequate devices at the best must be resorted to in order to represent the contour of a mountain and no device can represent its profile. The map must here be supplemented with the drawing. It is hoped that a good portfolio of profiles may be made up after the summer's work is done. To be most available to the topographer these should be upon a uniform scale, and that of a centimetre to a degree has been suggested. As all who have any acquaintance with mountains are aware, no one profile will adequately represent its many-phased proportions. Hence it would be well to obtain outline views from different sides, choosing, if possible, the most characteristic and diverse. With the name of the mountain the bearing of some prominent part, such as the summit, should be given. Panoramic views in profile as seen from good points of view are especially desirable and, published with the future volumes of the Club's proceedings, would prove of great value and interest.

A kindred field of work, though demanding a rarer talent and a more intimate acquaintance with the mountains, such as is only acquired by many a ramble over them and much study, is that illustrated on a large scale by Prof. Hitchcock's model. This covers the whole White Mountain region and has attracted much attention at our meetings. But models of smaller groups and even of single mountains would be very interesting, and a series of correct models of small sections would be a valuable feature of our art gallery. Here, also, a uniform scale is desirable, and that of $\frac{1}{10000}$ for distances, the corresponding heights being on a scale of $\frac{1}{5000}$, is suggested for small groups, and half this scale for long ranges.

Doubtless still other ways will suggest themselves to various members whereby art may be made to contribute to the usefulness and attractiveness of the Club. The Councillor relies on the enthusiasm of the constituency which he has the honor to represent, for the fulfilment of the reasonable expectation that this first year of the Club's existence may witness the formation of a promising nucleus for the future art gallery.

Reports of the Councillors for the Spring of 1876.
Exploration.

BY L. F. DEPOURTALES.

Read May 10, 1876.

In presenting the following suggestions of localities, of which the exploration is particularly desirable, I have had to rely greatly on the kind help of the President and the Secretary of the Club, whose local acquaintance is much more extensive than mine. It will be obvious to every one that the list might be made much more extensive, and that even in the most frequented parts of the mountain region many details are wanting which might be filled up with great profit.

1. The first region suggested is the one north of Dixville Notch.

2. The Pilot Range.

3. The Pliny and Randolph Mts.

4. The country north and east of the Androscoggin.

5. The mountains east of Wild River and between the Androscoggin and Mountain Pond.

6. The valleys of Mt. Washington River and Rocky Branch and the range from Boott's Spur to Iron Mt.

7. The range from Mt. Deception to Mitten Mt.

8. The Castellated Ridge or northern spur of Mt. Jefferson with its adjacent ravines.

9. Between Sawyer's River and Moat Mt., and the western slope of the latter.

10. The region between Tripyramid, Chocorua and Black Mts. and between Green's Cliff, Mts. Hancock, Tripyramid, and Osceola.

11. The northern slopes and intervening valleys between Mts. Lafayette and Willard.

12. The valley of the East Branch of the Pemigewasset.

13. The region between Moosilauke and Cannon Mts.

Most of the work to be expected from members of the Club in these parts will be at first simply of the character of a reconnaissance, more or less complete according to the means of each party. When afterwards triangulation points have been estab-

lished and the plane-table comes in use, the first hasty sketches will afford means of saving time by indicating the most practicable roads, the most extended views, &c.

In its simplest form the reconnoissance might take the form of a journal of the trip, with compass courses and distances. The latter can be estimated by the time taken in going from point to point, and it would be well to gain some experience on that point beforehand by walking over well-known distances up or down hill and in more or less dense woods. A pedometer would be of assistance after having determined its error in the same way.

When some open and tolerably level ground can be made use of, distances can be approximately obtained without angular measurement by means of small bases measured on the ground with a tape line or a rod. Two parallel lines must be established at a convenient distance from each other, say ten or twenty feet; on the farther one from the inaccessible object C, a base A B is measured and pointed vertical sticks stuck at A and B; on the second line A' B' similar sticks are placed in exact range with C. Measure A' B', carry that distance on the first base from B to D, then by the proportion $A A' : A C :: A D : A B$ in the two similar triangles, you obtain the desired distance A C with considerable approximation.

Profile views ought to be taken wherever practicable or desirable. An eye sketch can be made more accurate by estimating vertical or horizontal dimensions on a small scale held at arm's length; a string attached to the scale and held in the teeth insures having the scale always at the same distance from the eye.

Heights ought to be taken by the barometer if possible and reduced by obtaining corresponding observations from the station on Mt. Washington. Direct comparisons between the instruments ought to be made if possible at the beginning and end of the season.

Temperatures of all the springs met with ought to be taken, at their place of origin, and with proper precautions against heating from the sun.

**Reports of the Councillors for the Spring of 1876.
Improvements.**

BY WILLIAM G. NOWELL.

Read May 10, 1876.

The suggestions to be offered in regard to this department of the Club's work may be classified as follows:

I. Paths to be made. II. Record Bottles to be placed. III. Camps to be established. IV. Points of View to be cleared. V. Implements. VI. Expenses.

I. Paths to be Made.

Section A. Where.

Path No. 1. — Lowe's Path. The main path is to leave the Gorham road at a point midway between Jefferson and Gorham, near Brookvale, the residence of Mr. Charles E. Lowe, the guide with whom the Councillor of this Department mapped out this path and who is to be its chief constructor.

Crossing the Moose River, it will run through mixed forest, then tall spruce, and at length low spruce, about four kilometres, S. S. W., over a constant and gradual ascent, to the face of the broad bluff west of King's Ravine; thence, three kilometres, S., to the head waters of the West Branch of the Peabody River; thence, one kilometre, E. S. E., to the top of Mt. Adams. Only about three hundred metres of this path will lie among the troublesome scrub fir (rams' horns).

There will be two branches and two returns from these branches.

1°. Beginning five kilometres from the entrance at Brookvale, and running five kilometres, S. W., — to the top of Mt. Jefferson, — along the northern side of the crest of Adams and past Spaulding's Spring at the head of the Ravine of the Castles.

2°. The Return of Branch No. 1, from Spaulding's Spring, two kilometres, E. N. E., to Peabody Springs; connecting the head-waters of Israel's River and Peabody River, and passing over the sunny plateau south of the crest of Adams.

3°. Beginning six kilometres from the entrance of the main path, and extending four kilometres, E. S. E., by the head of King's Ravine and the sources of Snyder Brook to the top of Mt. Madison.

4°. The Return of Branch No. 3, from the top of Madison, three kilometres, W. S. W., to the top of Adams, with offsets to King's Ravine on the north and to Starr Lake on the south.

This path passes several springs in the lower half of its course, and reaches abundant water, in the driest times, at the four points on the ledges already mentioned. Its ascents are constant and generally easy. Out of the woods after the first four kilometres, it presents an uninterrupted panorama of magnificent views during the whole of its passage over the ledges, crests and summits of the three northernmost mountains of the Presidential Range.

It was inaugurated Sept. 7, 1875; and its construction the present summer is guaranteed.

Path No. 2. — Gordon's Trail. This path will be, essentially, a renewal of that which Mr. Gordon, Starr King's well-known guide, blazed and cut up the northern slope of Mt. Madison.

Entering the woods just beyond the bridge by which the Old Pinkham Road to the Peabody Valley crosses the Moose, two hundred metres from Wood's Corner, Gordon's Trail will run by a course nearly due south, about eight kilometres, to the top of Madison; in detail, as follows: two kilometres to the falls on Bumpus Brook; then one kilometre through tall spruce and one kilometre up Dry Brook, a tributary of Bumpus Brook; then three kilometres to the bare ledge near the upper knoll on the north spur of Madison, and one kilometre to the top of the mountain.

Some of Gordon's blazings along this path are still discernible, and it is yet comparatively open through the low spruce. This route to Madison and Adams is the shortest for pedestrians from Gorham.

Path No. 3. — Scudder's Path. Ascending Madison by a steady slope, from Imp Cottage (Dolly Copp's), six kilometres,

N. W., this path will furnish a new and desirable way of reaching the Alpine summits from the Peabody Valley, or of descending to that valley at the end of a walk from Mt. Washington, or over Adams or Madison by Paths 1 and 2.

Path No. 4. This path will lead from the top of Jefferson two kilometres N. to the Castles, and give access to the whole of the curious rock formations of the Castellated Ridge.

Path No. 5. — Gulf Path. This is intended to begin near the end of the 5th mile of the Mt. Washington Carriage Road, and pass N. W., and then N., around the head of the Gulf of Mexico to Jefferson, six kilometres or more. The views which it will afford can hardly be rivalled even by the path next named.

Path No. 6. This is to be a renewal of the Old Bridle Path up Mt. Washington. It will furnish a way of ascent much shorter than the Carriage Road, a charming walk through the lower woods, with noble views of Mts. Adams and Madison.

Path No. 7. This is also a renewal, — of Thompson's Path, from the second mile post on the Carriage Road to Hermit Lake at the foot of Tuckerman's Ravine, five kilometres S.

Path No. 8. An offset from No. 7 to such point as will afford the best view of the cataract that falls north of Fairfax Spire.

Path No. 9. Up the south bank of Crystal Cascade Brook to meet Thompson's Path at the foot of Tuckerman's Ravine, and go up the Ravine to the top of Mt. Washington. This path needs only renewal and proper marking.

Path No. 10. A renewal of the Davis Path, over Mts. Crawford, Resolution, and Giant's Stairs to Bigelow's Lawn and thence to the top of Mt. Washington, or to the head of Tuckerman's Ravine. This path will render desirable geological explorations in the neighborhood of Mt. Washington River more feasible.

Path No. 11. From the Iron Mt. Road (from Jackson) across the Rocky Branch, or a short distance up its valley, to connect with Path No. 10, near Giant's Stairs.

Path No. 12. From Jackson over a spur of the Carter Range east of Carter Notch, to Carter Dome, and thence descending

by Nineteen Mile Brook to Peabody Valley. An exploration is needed for the precise location of this path, and a clearing should be made on Carter Dome to open the magnificent views now screened by forest growth.

Path No. 13. Over Mt. Surprise to Mt. Moriah: the lower half needs re-making, and the whole needs marking in the proper manner. The views, especially of the great ranges, are unsurpassed in the mountain region.

Path No. 14. Up Starr King: the lower part needs bushing out, and the whole should be marked.

Path No. 15. A path or paths should be located and constructed on the Pilot Range.

Path No. 16. Section 1: a renewal of the path from Greeley's, in Waterville, to The Ponds, eight kilometres, N. — Section 2: over a spur of Kancamagus, ten kilometres, N. E., to the foot of Carrigain, and thence on to meet the wood railroad, and following the latter down Sawyer's River to Upper Bartlett. *Branches.* 1°. On one side or the other of Kancamagus, to the Swift River Valley. 2°. Up Carrigain from the southward. 3°. From Upper Bartlett, between Silver Spring and Table Mts., to Swift River Valley.

Path No. 17. Through Carrigain Notch, down the East Branch of the Pemigewasset to Pollard's. A camp should be established on this path.

Path No. 18. From near the Twin Mt. House, up the North Twin and ultimately over the whole Twin Range (South Twin, Mts. Guyot and Bond) to the East Branch of the Pemigewasset. This path, well opened and cleared, will give an almost continuous prospect, of great extent, toward the White Hills on the one side and the Franconias on the other.

Path No. 19. To Merrill's at the foot of Moosilauke, beginning at the end of a road which runs westward ten kilometres up Moosilauke River, from the Pemigewasset Valley.

Path No. 20. A renewal and marking of the path from below the East Branch of the Saco, over Mt. Bartlett to Kiar-sarge (Pequawket). This path gives, at several points in its ascent, fine views to the north, west and south.

Out of these twenty paths we would select to recommend for

speedy construction those numbered respectively 1, 5, 12, 13, 14, 16, 18. The personal convenience of some members of the Club may lead to the choice of others of the paths named, or to the adoption of routes not specified in this report.

Section B. How.

It is suggested, first, that all paths be made of good width, from six feet to eight feet; second, that they be cleared of all underbrush and trip-roots; third, that holes in them be filled, so far as practicable; fourth, that the following system of markings be adopted.

1°. At the entrance of each path, there should be placed at the point where the path leaves the travelled road a sign-board painted with black letters on a white ground, and at the point where the path enters the woods a similar board in sight from the first and, if possible, all the way between the two.

2°. Through all woods, blazings on the trees. These should be made within easy range of sight. There should be two blazings on each tree marked, one on the side facing up, and the other on the side facing down the path. That on the upper side, reckoning towards the highest summit to be approached, should be a foot, or more, higher than that on the lower side, toward the bottom of the path.

Each blazing on a path constructed by members of the Club should be marked at the bottom by three parallel horizontal cuts made with the hatchet.

When any path constructed has been reported to the Councillor of this Department and approved by the Council, each blazing along its course through the woods will be stamped with the Club's official stamp (**A**), and rocks along its course over barren tracts will be marked with the Club's stencil (**A. M. C.**) in white.

Other signs, of birch bark, &c., may be attached to trees, where special marking is desirable.

Pyramids of four rocks (three for a base, with one above them) are to be used wherever such guides would be of service, especially upon the alpine summits.

At convenient and conspicuous places the distances and bearings of the path and of neighboring summits and other points of interest should be indicated, and upon rocks, especially above the woods, arrows should be painted, in white, pointing toward the nearest summit.

II. Record Bottles.

These are intended to be placed under cairns, or attached to trees or signal-staffs. They should be used, sparingly, upon summits difficult of access, at the signal-stations of the topographical department, in camps, or at other localities of special interest. They are intended to contain records of exploring parties, and to afford opportunity for the entry of suggestions and information useful at the points of deposit.

A number of these bottles have been suitably prepared, with a roll of paper on a pivot, pencil, tight corks, and fastenings of copper wire. Members of the Club can obtain them on application to the Councillor of this Department.

III. Camps.

It is suggested that permanent camps be established by members of the Club at such points of interest in its work as Mt. Adams or the East Branch of the Pemigewasset. Such camps will serve as centres for the working parties and may be built so as to last several years. A bark camp, well constructed, would do service, with a few repairs, more than one summer; but a log and board camp much more permanent can be made at a trifling cost.

IV. Points of View.

Explorations are needed to determine what are the best points of view not as yet easily accessible, or at present obstructed by forest growth.

When determined, paths should be constructed to such points of view; and if it be a mountain top which offers the view, either the summit or spots below the summit toward the four cardinal points of the compass, should be cleared of trees and under-brush. The following localities are mentioned as

requiring more or less preparation for the purposes contained under this head: Cherry, Carter Dome, Carrigain, North Twin, Tripyramid, and the Cataract above Thompson's path (No. 7).

V. Implements.

The following implements have been prepared by the Club for use in this department.

1°. The Record Bottles. 2°. The Stamp which is to be attached to the head of the blazing hatchet. 3°. The Stencil of the Club (**A.M.C.**).

The stamp spoken of is a letter **A**, of steel, about four centimetres tall, cut upon a face five centimetres broad. It has sharp edges, each of a single line; and is to be driven into the wood of the blazing by a blow, as one would strike with the hatchet head.

Other implements are needed, in this and other departments, and will ultimately be provided: such as non-elastic measures marked in accordance with the metric system, plane-tables, and other conveniences for the summer work of the Club.

VI. Expenses.

Under this head, the Club has done what it could, in its infancy, towards providing implements. Individual members will doubtless feel disposed to assist in accomplishing some of the improvements suggested, with their purses as well as with their time and labor. They will also find that interested neighborhoods will be ready and eager to help them construct paths and open desirable points of view, and appeals should be freely made in such quarters.

In conclusion, the Councillor would add that his address for the summer will be at Mt. Adams House, Jefferson, N. H., and that he will be glad to join with any members in carrying out any of the improvements suggested, or any other that may prove desirable.

Proceedings of the Club.

On the 1st of January, 1876, about fifty cards of invitation were issued reading as follows:

Boston, Jan. 1st, 1876.

DEAR SIR: You are hereby invited with your friends to attend a meeting of those interested in mountain exploration, to be held at the Institute of Technology on Saturday, January 8th, at 3 P. M.

Yours truly,
E. C. PICKERING.

The first preliminary meeting, held Jan. 8, 1876, was organized by the election of Prof. C. E. Fay as Chairman and Mr. J. B. Heuck, Jr., as Secretary.

Prof. E. C. Pickering stated that the meeting had been called to consider the advisability of forming a permanent Society or Club of those interested in Mountain Exploration and kindred subjects, and described some of the work which he believed might be accomplished better by organized than by merely individual effort.

The name and object of the proposed association were then discussed, and Messrs. Scudder, Pickering, Niles, Bigelow and Hunt were appointed a committee to prepare a Constitution and By-Laws.

At the second preliminary meeting held Jan. 12, 1876, Prof. E. C. Pickering in the chair, Mr. S. H. Scudder presented a partial report of the Committee on Organization, which was discussed at length and re-committed.

Mr. M. F. Sweetser read a list of new and doubtful names of New Hampshire mountains proposed for adoption in the new Guide Book of the White Mountains, preparing for Messrs. J. R. Osgood & Co. Messrs. Sweetser, Pickering and Huntington were appointed a Committee upon the Nomenclature of the White Mountains

The third preliminary meeting was held Jan. 26, 1876, Prof. Pickering in the chair. The Committee on Organization submitted a draft of a Constitution, which was discussed, article by article, and finally adopted in the form printed on pages 3-4 of this number, with the exception of the latter portion of Article IV, which was referred back to the Committee, to be returned in a new draft.

Prof. C. H. Hitchcock exhibited a new wooden model of the White Mountains, prepared under his direction.

Mr. Sweetser presented the report of the Committee on Nomenclature appointed at the preceding meeting. The Report was accepted and adopted (see p. 7).

February 9, 1876.—First Regular Meeting.

Prof. E. C. Pickering in the chair.

The Committee on Organization reported several forms of phraseology for Article IV of the Constitution; after a long discussion, the first of the proposed plans was adopted, as printed on page 3.

After voting that all persons who have signed their names, as an indication of their interest in the objects of the Club, or have written to the acting Chairman or Secretary to a similar effect, be enrolled as Original Members of the Club, the following officers were elected:

President, Edward C. Pickering.

Vice-President, Samuel H. Scudder.

Secretary, John B. Henck, Jr.

Treasurer, E. B. Bigelow.

Councillors: Natural History, T. Sterry Hunt.

Topography, Charles H. Hitchcock.

Art, Charles E. Fay.

Exploration, Edward S. Morse.

Improvements, W. G. Nowell.

March 8, 1876.—Second Regular Meeting.

The President in the chair.

The public were invited to attend this meeting and nearly two hundred ladies and gentlemen were present.

A letter was read from Mr. Bigelow declining the office of Treasurer, and Mr. H. F. Walling was chosen in his place. Prof. E. S. Morse also declined the office of Councillor for Exploration, and Mr. L. F. de Pourtales was elected in his stead.

On the recommendation of the Council, the Club voted to admit women to membership.

A letter was read from Rev. John Worcester, of Newtonville, offering his study at North Conway, N. H., as a summer rendezvous for the Club. On recommendation of the Council it was voted: that the Club offers its hearty thanks for the generous proposal of Mr. Worcester, and will gladly avail itself of the privilege conferred.

The President, in view of the large number of persons present who were not at the first preliminary meeting, made a statement of the objects of the Club.

Prof. C. H. Hitchcock presented a paper on the Atlantic System of Mountains (see p. 11), which was discussed by Professors Rogers and Hunt.

Prof. Charles E. Fay read a paper entitled: A Day on Tripyramid (see p. 14), which elicited some remarks from Prof. Hitchcock concerning the geological value of the Slide and its probable origin; it was further discussed by Messrs. Jenney and Covill.

Mr. S. W. Holman exhibited and described two new forms of mountain barometer (see p. 25).

March 15, 1876.—Special Meeting on Topography.

The Councillor on Topography in the chair.

Plans for the construction of a map of the White Mountains were discussed and a committee, consisting of Messrs. Pickering, Walling and Henck, was appointed to advise with the Chairman regarding work for the approaching summer.

April 12, 1876.—Third Regular Meeting.

The President in the chair.

Mr. S. H. Scudder presented a communication on the proper name of the mountain called Pequawket, or Kiarsarge.

Mr. G. E. Emery spoke in favor of the name Pequawket and Mr. G. V. Fox in favor of the name Kearsarge. Papers upon this subject will probably be prepared for a future number of APPALACHIA.

Prof. E. S. Morse exhibited a new form of harness, or saddle for carrying a pack, which it is hoped may be illustrated in the next number of APPALACHIA.

Mr. J. B. Henck, Jr., described a map of the White Mountains, which he had constructed during the past summer (see p. 26).

Mr. Warren Upham read a paper upon the East Branch of the Pemigewasset (see p. 29).

Prof. E. C. Pickering exhibited the MSS. and described the work of the late Prof. Bond among the White Mountains; an account of these is reserved for the next number of APPALACHIA.

May 10, 1876.—Fourth Regular Meeting.

The President in the chair.

The reports of the Councillors were presented, proposing plans for work to be done during the summer. Dr. T. Sterry Hunt read the report on Natural History (see p. 35); Prof. Pickering, in the absence of Prof. Hitchcock, that on Topography (see p. 38); Prof. Fay that on Art (see p. 45); Mr. Pourtales that on Exploration (see p. 49); and Mr. Nowell that on Improvements (see p. 51).

These reports were discussed at length.

May 31, 1876. — Adjourned Regular Meeting.

The President in the chair.

The President read a communication which had been sent by the Council to the Superintendent of the U. S. Coast Survey, urging the importance of the work of the U. S. Inter-oceanic Geodetic Connection in New Hampshire.

The reports of the Councillors were further discussed, and various scientific and camping implements and tourist's clothing exhibited.

June 14, 1876.—Fifth Regular Meeting.

The Vice-President in the chair.

Mr. J. R. Edmands was appointed Secretary *pro tempore*.

A letter was read from the Society of Natural History offering the use of one of the alcoves in its library to the Club as a place of deposit of books, maps, etc. The offer was accepted with thanks.

The report of the Councillor on Exploration was then read, and in the discussion which followed it was shown that the different fields specially designated for exploration divided naturally into three groups, one of which would be approached from some point in the Pemigewasset Valley, one from North Conway, or Upper Bartlett, and one from Jefferson Hill or its vicinity. Persons wishing to join parties to the first region were requested to communicate with Prof. Fay; to the second with Rev. Mr. Worcester, and to the third with Mr. Nowell.

Prof. N. S. Shaler made a communication upon explorations of the Appalachian Region, particularly in the South.

Mr. J. R. Edmands exhibited a portable camera for drawing profiles and details accurately to scale.

The lens is a spectacle glass an inch and a half in diameter and rated at twenty-two inches; but its actual focal length must be a little less. The paper surface upon which the drawing is made is a portion, six inches high, of a vertical cylinder, the radius of whose base equals $\frac{2}{3}$ of $180 \div \pi$ or about twenty-one and a half inches. The lens is mounted so as to turn about a vertical axis which passes through its centre and coincides with the axis of the cylinder.

Only a portion of the view is seen with any one position of the lens; and the 'field,' or imaginary surface upon which the rays come to a focus, intersects the paper, lying part before and part behind it. Hence the lens may be so turned as just to focus that particular part which it is desired to draw at the moment. It is important to notice that rays of light proceeding from any point converge upon the continuation of the right line drawn from the point to the centre of the lens, whatever be the position of the lens. Therefore the operation of focussing by rotating the lens does not alter the position of the image upon the paper, as would be done with the ordinary way of sliding the lens back and forth. We are also thus able to cover a wide field in the aggregate (a trifle over a right angle with the instrument shown) without using pencils of light which pass the lens at any considerable obliquity to its axis; — a great advantage, since these oblique pencils never come to a satisfactory focus, as has been shown by Prof. Pickering and Dr. Williams.

The scale for horizontal angles is three-eighths of an inch to a degree, which enables a paper scale to be readily constructed, since one-sixteenth of an inch equals ten minutes. For the careful determination of vertical angles it will be necessary either to apply a correction to measurements

made with the same scale, or to use a scale of tangents. The scale of a centimetre to a degree, recommended for profiles, was reluctantly discarded because it calls for a lens of focal length a little under twenty-three inches, which was not readily procurable.

The whole is so supported on short tripod-legs as to bring the paper opposite the eye of the operator seated on the ground; and when dismounted the apparatus is compact and easy to carry.

A full account of this instrument will appear in a future number of *APALACHIA*.

Messrs. Worcester and Pickering were appointed a committee to make preparations for the field meeting of the Club at North Conway, on the fourth Wednesday of July, with directions to add one to their number.

APPALACHIA.

VOL. I.

BOSTON, MARCH, 1877.

No. 2.

The Annual Address of the President.

BY E. C. PICKERING.

January 10, 1877.

IN retiring from the position of President of this Club it becomes my duty, at the same time that it is a pleasure, to make a farewell address. As the first to whom this privilege has fallen, it seems advisable that I should give you a brief history of the origin of the Club, what it has accomplished, and suggestions of work yet to be done; or its past, its present, and its future. The first suggestion of our Club must date back many years. Almost any person exploring the mountains with a definite end in view must have wished for some means of bringing his results to the notice of those most interested. On first suggesting our Club to our present Councillor of Exploration, I found that he had had in mind such an organization for many years. Our Councillor of Improvements also, having made my acquaintance by seeing my name on the Mt. Adams register, was on the point of writing to me to suggest our Club, when he heard that it was in process of formation. In 1873, when passing my first summer among the mountains, I often discussed the advantages of a Mountain Club. I remember in particular the ascent of one of those many summits said to be unascended and inaccessible, which we have all gone up, only to find them frequently visited and presenting no difficulty. Discussing with my companion the advantages of such an organization, we said we would make a path up this very mountain were there a Club who would appre-

ciate it and find it of permanent value. About this time I heard of the Portland White Mountain Club, and supposed that the desired object had been attained through it. The object of the Portland Club is, however, amusement rather than scientific study and exploration, and accordingly the want still remained unsupplied. Passing the summer of 1875 in the same house with our indefatigable Secretary, we brought the plans of a Club into a more definite shape. On the 1st of January, 1876, we issued twenty or thirty invitations to those interested in *Mountain Exploration* to meet at the Institute of Technology. In organizing, we met with our first difficulty, the rock on which we came near splitting. The question was on our name, and the kindred but more vital problem of our objects. Some wished to form a Geographical Society, and that our work should be mainly scientific, with the walks and explorations as a secondary feature. Others wished for a White Mountain Club, or a Mountain Exploration Society, with mountain walking and excursions as a prominent feature. The Alpine Club also had its advocates, while at one meeting the New England Mountain Club was unanimously recommended in an informal vote. It was afterwards maintained that but one person took part in this vote, no one else being bold enough, on so important a question, to venture even informally to express what he thought! The adoption of the name Appalachian Mountain Club, with the objects given in our Constitution, seems to have been a wise step. It gives us, and was intended to give us, a very wide scope. By Appalachian, whatever the geologists may say, we should include everything east of the Mississippi, while by adjacent regions some insist that the Himalayas and even the lunar mountains should be included. If our own members had such difficulty in determining our objects, it is no wonder that the public misjudged them. One gentleman told me that he would like to join our Club were he not already connected with so many *gymnastic* societies! Many others would have joined us, but they feared that they had not the requisite scientific knowledge! In reality all interested in mountain work are welcome to our ranks, from the man of science to the simple pedestrian and explorer.

Having obtained a name ourselves, the names of the mountains were among the next subjects which received our attention. A system of nomenclature was adopted by which every summit may be simply designated by a perfectly characteristic symbol. Although this system is described by a popular monthly as dry and unæsthetic to the last degree, it has certainly fulfilled its object, and few of those who have used it would be willing to give it up. Q. 8. 1 may puzzle our poets, but it is free from the ambiguity of Black Mountain, and the inappropriateness of Sandwich Dome. The publication of a new Guide Book of the White Mountains involved the Club in the controversy regarding the names of many of the summits. Those who criticised our action, however, did not consider how much more fairly a Club like ours could decide on the proper name for a mountain than could any single individual. Some one must decide, and that at once, since the Guide Book was to be published immediately, and the names there given would have a very wide circulation. It would be difficult to find a fairer tribunal than ours, which consisted of many persons, representing very various views. We had no desire to introduce new names except for points as yet unnamed. We carefully discussed each doubtful name, and based our decisions on all the accessible authorities, priority, established usage, appropriateness, freedom from ambiguity and any other arguments which might be suggested.

Our Constitution, largely the work of our newly elected President, has been found well suited to our wants. No change has proved necessary, but an extension of active membership to residents outside of New England, and a new definition of associate and honorary membership. The formation of our Council is well adapted to the performance of a large amount of work, since definite duties are assigned to each member, but it has the corresponding objection that the neglect of a single member seriously restricts the work of the Club.

Of the ten meetings we have so far held, we have every reason to be proud. The large attendance and the interest shown, proves that I have not over-estimated the value of the papers presented. The large number of persons who have

taken part in the discussions is another evidence of their general interest. The Field Meeting at North Conway also proved a success, largely through the hospitable reception and the admirable accommodations offered us. Although the residents had been prejudiced against us, and many of them supposed that we had come for the purpose of carrying off their favorite mountain, they must have seen that we were something more than mere pleasure seekers, and had come in pursuit of knowledge as well as amusement. Our three days for hearing communications, for the mountain climb, and for the railroad trip through the Notch, will long be pleasantly remembered by us all. The war-cloud regarding the name of the mountain called Kiarsarge, Kearsarge, Pequawket, Pigwacket, (?) and P. 1. 1, assumed its most portentous dimensions at this meeting. It is obvious that the local feeling is so strong in support of different names that it will be impossible to recommend the adoption of any one without exciting violent opposition. On the other hand, there can be no question that an examination of the evidence in support of the various claims is a legitimate work of the Club, since we can doubtless look at the matter with a more unprejudiced eye than those living near either the Conway or the Warner mountain, and the question is one of general, as much as of local, interest. The request of the U. S. Coast Survey that we would examine the matter, should also remove all doubt, if any remains.

The principal scientific work of the Club for the past season, has been in the direction of Topography. Although but a few members have taken part in this work, and considering that the work has been wholly volunteer, the amount of material collected is surprisingly large. We have collected all the available measurements from the work of Profs. Bond, Locke, Vose, and Hitchcock, and these, with the observations of the Coast Survey for our basis, give a good outline on which the details of our survey will depend. Much valuable work will thus be rendered permanently useful which would otherwise be lost.

Of the work of members of the Club we should first mention the survey of Mr. Henck, who made a complete map of

the White Mountains as the result of one summer's work with a plane-table. This map, published in Appalachia, No. 1, though less pretentious than many of the maps which have preceded it, must have amply proved its superiority to all who tested it last summer. One of the greatest achievements of the Club has been the introduction of a new instrument in topography, one which bids fair to cause quite a revolution in mountain surveying — the topographical camera of Mr. Edmands. Many members of the Club have learned to realize the value of mountain profiles, and when, as in this instrument, they may be drawn with an accuracy approaching that of a theodolite, a complete survey may be made by their aid. Of my own topographical work I will not speak now, as I have already described it to the Club. It includes between six and seven thousand measurements of the horizontal and vertical positions of the mountains, and will probably determine the heights of all the prominent summits with much greater accuracy than they have previously been measured.

The work of the Club that will most interest the public has been in the Department of Improvements. The unwearied efforts of the Councillor of this Department could scarcely fail to bring forth good results. That we should have succeeded in rendering Mt. Adams, previously a difficult and rarely visited peak, now easily accessible to any good pedestrian, is certainly a triumph for the work of one year. The details of this work will be published in full elsewhere, and I need only call your attention to the fact that probably more persons visited this summit last summer than in all previous years, and that the almost unequalled prospect was also enjoyed by several ladies. The substantial character of the path will form a good precedent for our future work, and the excellent plan of marking at short intervals the distances and elevations, is to be recommended. The work on Carter Dome also promises valuable results with a comparatively unknown and unvisited, but almost equally interesting mountain. The liberality of the proprietors of the Glen House, and of a member of this Club, have rendered the construction of this path a certainty. The excellent camp on Mt. Adams will doubtless soon be followed by others, which will add

greatly to the comfort and convenience of those visiting the more remote regions. Several explorations have been carried out successfully, and the interest in this portion of our work seems to be wide spread.

During the past year the Club has entered into friendly relations, by correspondence and otherwise, with various scientific and literary organizations, especially with the Coast Survey, the Geological Survey of New Hampshire, the New Hampshire Historical Society, and the Rocky Mountain Club. From the Coast Survey we have obtained many facts that have proved of the greatest value, and have reciprocated by such information as our greater familiarity with the country enabled us to give.

The present condition of the Club is highly satisfactory. Our meetings are interesting and well attended. There is abundance of material for communications, our difficulty being rather to keep the duration of our meetings within bounds. One danger, common to all societies, I hope we shall avoid, the feeling of antagonism between the members at large and the officers, or, in our case, the Council. There may be a feeling on the part of the members that the Council desire to take the power too much into their own hands. I think I express the sentiment of every member of the Council by saying that this is far from being the case. On the other hand, there is rather a feeling that the members do not take a sufficiently active part in the management of the Club. A very large majority of the papers presented at our meetings have been by members of the Council, and the nominations for membership have been almost entirely by them. I hope the next year will see a change in both these respects. Short papers by many speakers are far more attractive than long addresses by a few, and the interest of many of our meetings has arisen in a great measure from the discussions in which many members have expressed an opinion. Every additional person who will speak briefly, will add to the interest of our meetings. I hope during the next year our membership will increase largely. This can be accomplished only if the members interest their friends in our work, and induce them to join us. I hope we may secure a very large membership of

persons interested in mountain exploration, as thus alone, with our present small assessment, can we accomplish great results. Our work should also be extended to the Green Mountains and the Adirondacks.

Of the future of the Club I should speak with hesitation, had not our greatest expectations at the outset been more than realized. It would not require a large sum yearly to give the Club a room in which to collect a library of books, maps, photographs, and paintings of the mountains, although the immediate need of this is avoided by the liberal action of the Institute of Technology and Boston Society of Natural History. Last year we corresponded with Dr. Bemis, hoping that we might make some arrangement for the use of the Mt. Crawford House for a summer rendezvous for the Club, and it is possible this plan may still be carried out. A summer school of topography was also talked of, under the auspices of the Club, teaching surveying with special reference to State Surveys, and making this hotel our head quarters. The interest of the Club is now directed largely towards Mt. Adams. A plan has been proposed which I wish might be accomplished, by which the Club should purchase a small house near the foot of the path up Mt. Adams, to be leased to our efficient guide, Mr. Lowe. Members might thus board at five dollars a week, and be within easy reach of the grandest scenery in New England. The total cost of this enterprise would be only eight hundred dollars, which includes the purchase, not hiring, of the house. A course of lectures on the mountains, to be illustrated by photographs projected by the lantern, has been proposed. The arrangements were made in part, and could be easily completed if desired. Among other minor plans may be mentioned a book in which we could collect all available information regarding every prominent summit, and another for each hotel and boarding house among the mountains.

Our year's record has been one of continued progress. From a small beginning we steadily advanced until we have now an active, well established Club, supplying a clearly marked want of the community, and therefore almost certain of success. The large amount of work accomplished is in a

great measure due to the number of persons who have taken an active interest in carrying out our plans. Among them is our Secretary, to whose unwearied and persevering efforts our present success is largely due. While he, and many others whom I might name, retain their active interest in the Club, we need have no fear that our progress will not be sure.

I shall always remember with pleasure my relations to this Club, as its first President, and shall none the less heartily aid in our future work because I am freed from its responsibility. I congratulate the Club in their choice of my successor, and have no doubt that under his skilful guidance great progress will be made during the coming year.

Geology of the White Mountains.

By C. H. HITCHCOCK.

Read July 26, 1876.

The following statements are mainly explanatory of a map of the White Mountain District, designed originally to illustrate the distribution of nearly a thousand specimens obtained for the Geological Survey of New Hampshire, and belonging to the College of Agriculture and the Mechanic Arts at Hanover. Broad lines have been drawn around those specimens belonging to the several groups, and indicated by the full name or a natural abbreviation. Contour lines for each 500 feet also appear, but the names of mountains, rivers, and ponds are omitted.

The formations occurring in this district are the following, commencing with the oldest: 1, Porphyritic, 2, Bethlehem, and 3, Lake gneiss; 4, Montalban series; 5, Franconia breccia; 6, Labrador system; 7, Huronian; 8, Andalusite slates; 9, Coös group; 10, Helderberg, just in the edge of the map; and, 11, Glacial drift deposits. The last are not indicated upon the map, but will be mentioned. The following are the names applied to large eruptive areas: 1, Conway; 2, Albany granites; 3, Chocorua sienite and granite; 4, Porphyry; 5, Sienite of Tripyramid; 6, Pequawket breccias. Besides these are extensive dikes of Diorite, Dolerite, and Trachyte.

The first five of the stratified series are ranked with the Laurentian by some authors. In the absence of complete studies of the known Laurentian areas, I shall regard only the first of them as belonging to that group; since a rock of that nature is described as characteristic of the period both in Europe and America. The others hold the place of the Laurentian in the common estimation, since they underlie the Labrador system unconformably and are nearly as old.

1. *Porphyritic Gneiss*. Two lines of this fundamental rock underlie the mountains. The first extends from Ellsworth and Thornton to Franconia beneath Mts. Moosilauke, Kinsman and the back of Profile to Franconia, rising to view again at the Wing Road Junction. The second proceeds northeasterly from Sandwich, supporting Sandwich Dome, Whiteface, the Chocorua range in one direction, and bifurcating northerly so as to lie beneath Osceola and Carrigain. These lines occupy the western and southern borders of the mountain district.

2. *Bethlehem Gneiss*. The second gneiss is largely composed of protogene, and occupies an area reaching from Randolph to Littleton, including Bethlehem, where its width and thickness are greatest. An inexperienced eye will not always detect the stratified planes in this rock. Between two areas of porphyritic gneiss in Franconia and Bethlehem, this rock has the structure of an inverted synclinal, and is therefore believed to be the newer of the two groups.

3. *Lake Gneiss*. This formation touches the outer limits of the map in several places. It is usually a well defined gneiss with no peculiarities of mineral composition. A section from Whitefield to Twin Mountain shows the Bethlehem group in an anticlinal attitude, overlaid upon both flanks by this well defined gneiss, which for that reason is believed to be the newer formation. In Sandwich this gneiss dips towards the oldest gneiss, and is therefore an overturn or overlying mass. The areas occupied by this rock are often depressions in the surface.

4. *Montalban series*. These rocks are gneisses, feldspathic mica schists, both often holding andalusite, micaceous quartzites and granitic layers similar to those familiarly

known as "Concord granite." They occupy more space upon the map than any other single group. The area includes the highest White Mountains from Mt. Webster to Mt. Hayes in Gorham, with much territory upon both sides, and occupies the whole of the eastern border, and the southern as far as the middle of Sandwich. This formation is believed to underlie most of the granitic area, coming up to the surface occasionally, as in the large range between Mt. Kinsman and the north edge of Campton and the smaller outcrops of East Lincoln, southwest part of "Pemigewassett," Sandwich Dome, west of Mt. Chocorua, and the Hart's Mountain patch. A section along the Grand Trunk Railway and the vicinity north of Gorham shows Montalban rocks overlying both flanks of the Milan anticlinal of Lake gneiss. The counterpart of this older rock upon the southeast is thought to be a subterranean mass extending northeasterly from Lake Winipесаукее, and giving rise to the anticlinal dip divergence of the Montalban rocks near Fryeburg, Me.; for the usual dip of all those rocks northwest of Fryeburg is towards the same point of the compass, and towards Portland, Me., to the southeast. The northwesterly dips, when carefully studied, allow us to believe in the existence of several subordinate axes. First, there is the synclinal north of the Presidential range; second, this main range is believed to be an inverted anticlinal; third, there is a synclinal in the southern Pinkham notch, as indicated by the presence of a superior rock; fourth, an inverted anticlinal before reaching the Huronian quartzites of Jackson, which occupy the fifth place, of a synclinal; sixth, an anticlinal developing the easterly dip upon Tin mountain; seventh, certainly one synclinal before reaching the great anticlinal near Fryeburg.

The strike of the strata crosses the Montalban area in the Pemigewasset Valley transversely. There is certainly an anticlinal in Thornton, and perhaps others farther north.

5. *Franconia Breccia*. This series was composed by cementing together fragments of all the preceding formations with a fine-grained granite. It occurs in the Franconia and White Mountain notches. Its existence suggests the probability of an epoch of elevation at the close of the Montalban

period of deposition; but this may not have been the first in the long series of disturbances that have affected the White Mountains.

6. *Labrador system.* Six areas of labradorite rocks have been observed in this field: on the southwest side of Mt. Tripyramid, in Waterville; on Mt. Washington river; Lincoln, on Loon Pond Mountain; south end of Mt. Lafayette; Bean's Purchase; and Stark. The sections in the typical localities represent supposed metamorphic strata composed of labradorite and chrysolite, or mainly labradorite, resting unconformably upon porphyritic and Montalban gneisses. The discovery of certain dikes of similar character upon the east side of Mt. Washington and elsewhere, containing bits of native iron, suggests an igneous origin to some areas at first referred to a stratified series. At present the evidence is not strong enough to regard masses covering areas more than a square mile in extent as eruptive, but as the representatives of the Labrador system of Canada and New York. The appearance of these few outliers enables us to associate the Montalban series with the Laurentian rather than the later Huronian and Cambrian systems. The same would be true in case the labradorite rocks are considered to have been erupted.

7. *Huronian.* This system does not occur in this district to any great extent. A narrow range of dark quartzites in Jackson is referred here with some hesitation. Along the western edge of the map, in Lisbon, the green hydro-micaeous schists, with protogene, are abundant.

8. *Andalusite Slates.* Limited areas of clay and micaceous slates occur in three widely separated localities. The first is on the east side of Mt. Washington, showing finely its numerous crystals of original and altered andalusite along the carriage road. Another has a sigmoid shape, extending from the top of Mt. Willey to the top of Mt. Tom, both ends terminating abruptly, as though broken off from some undiscovered continuation. The other areas underlie Mt. Pequawket, and the existing masses may not equal in cubic contents the sum of the dimensions of the fragments scattered through the upper part of the mountain.

9. *Coös group*. This formation consists of three parts, quartzite, staurolite schists, and slates, and it is known only along the Ammonoosuc Valley in Whitefield, Littleton, and Lisbon. The quartzite range in Benton has quadrupled in its dimensions, possibly from a shoving together of a considerable breadth of measures. The schists in Lisbon are inverted, dipping northwesterly. The range of andalusite schist in Benton and Ellsworth is allied either to groups 8 or 9, and both formations may represent the same geological period.

10. *Helderberg*. Rocks of the Lower Helderberg age have been described from Littleton, with such fossils as *Halysites*, *Favosites*, *Pentamerus*, *Lichas*, and enormous crinoidal stem fragments. The occurrence of Helderberg strata in a vertical position just on the edge of the White Mountains affords data for establishing the date of the principal epoch of elevation. The most extensive submergence known in New England since the dawn of the Cambrian age is indicated by the distribution of these coralline beds. In eastern Maine these strata occur considerably inclined and overlaid by horizontal Hamilton beds. Hence evidence is afforded of a powerful disturbance in the later Devonian times, extending over the whole of the New England section of the Atlantic area. It is probable that the great Appalachian revolution occurring at the close of the Carboniferous age did not materially affect any part of the Atlantic area.

11. *Glacial era*. There were two important sets of ice action in the White Mountains, the first a southeasterly movement over every part of them, even the summit of Mount Washington; the second, existence of local glaciers sliding down the valleys of the Ellis, Peabody, Ammonoosuc and Saco rivers. Previous authors have not supposed evidence of the S. E. current could be found upon Mt. Washington. The indications are: First, boulders of Bethlehem gneiss, transported from Jefferson or Carroll, twelve miles distant, and perhaps carried up an elevation of 4,000 feet. Some have doubted this evidence. Such should examine a boulder of 93 lbs. weight in our Museum at Hanover, which I brought from very near the summit of Mt. Washington, where it was partially covered by other blocks of stone that had not been

transported so far. Second, the till of the summit contains numerous glaciated stones, mostly such as have been transported not over four miles. Third, the till is covered by very large angular blocks, usually supposed to have fallen from adjacent ledges by the riving action of freezing water. Their occurrence far away from any possible ledges upon nearly horizontal areas indicates an ice transportation. Fourth, striæ running S. 42° E. have been observed, with embossment of the ledges. The marks are faint, but such as would be relied upon to indicate the course of the drift in lower regions, where the markings are rare. This direction is nearly the same with that common in the vicinity.

The other surface phenomena of interest are the crude terrace deposits brought down by the mountain torrents in the Saco Valley at right angles to the course of the main stream, easily mistaken for terminal moraines, and the eskers in the valley of the Ammonoosuc, believed to have been deposited by glacial rivers during the disappearance of the great ice sheet. One of them was the Giant's grave by the Fabyan House, now removed, and by the older geologists who accepted the iceberg theory, thought to have been an ancient sea beach.

ERUPTIVE ROCKS.

An inspection of the map will show that the several eruptive rocks of the White Mountain District occupy the central portions in a nearly unbroken mass. They also lie in essentially horizontal sheets, one upon the other, in the order enumerated above. The first on the list, or the Conway granite, lies at the base, resting upon a gneissic floor of inclined strata, and overlaid by the Albany granite, each of them being sometimes 1000 feet thick. There are no signs of even obscure stratification in any of the eruptive series, unless it be the porphyries. Both horizontal (slightly inclined) and vertical joints or seams divide all these rocks into rectangular blocks. If it were allowable to speak of these igneous rocks as formed in direct succession, the lowest one first, it might be said there was a fiery lake of liquid material, occupying a hydrographic basin of some 400 square miles in extent. Physicists claim, however, that some of them must

have been formed under enormous pressure, perhaps such as would be indicated by several miles' thickness of rock. If such doctrines are correct, it is not clear that the lowest of the series was formed first.

The Conway granite answers well the type idea of this rock — a uniform aggregate of coarsely grained fragments of amorphous quartz, crystalline feldspar and mica. We find occasionally the quartz in crystals, and two kinds of each of the other minerals. The Albany granite is usually devoid of quartz, and the feldspar crystals may be porphyritic. The Chocorua granite is commonly hornblendic, and rarely chrysotitic. The porphyries are red, chocolate, and slate colored, both compact and brecciated. They resemble the Huronian porphyries of eastern New England. The Pequawket breccia consists mostly of slate fragments enclosed in a paste resembling the Albany granite. The Moat mountains are also composed of this material. Very coarse labradorite diorites occur in the Waterville slide and at the Jackson tin mine. Mr. G. W. Hawes has recently discovered interesting dikes of trachyte in Albany. This has hitherto been regarded as not older than the Tertiary. Mr. Hawes also finds some of the trap dikes to resemble the doleritic igneous ejections in the Triassic rocks of Massachusetts.

Carter Dome and Vicinity. An Exploration.

BY WILLIAM G. NOWELL.

Extract from a paper read Oct 11, 1876.

We had roamed and camped four days and nights on the Great Range, then trudged down the sandy pass of the Ellis in the hottest air of the summer; but the next day found our Appalachian guide, Chas. E. Lowe of Randolph, N. H., Dr. F. I. R. Stafford of Montreal, and the present narrator, ready to start from Jackson City on our long anticipated exploration of Carter Dome and its approaches. So, in mid-forenoon of Aug. 26, packs on backs, we set our faces again towards the clear blue northern sky, and strode gayly up the steep road which ascends the high valley of the Wildcat.

In the mood befitting explorers we allowed an artist-tent bravely pitched on the rocky bed of the roaring stream to draw us aside, and introduce to us Mr. Geo. N. Merrill, one of the few pedestrians who have ventured upon any part of the Carter Dome Group. One kilometre (five-eighths of a mile) from the Thorn Mt. House we paused on the brow of a gentle declivity to sketch the graceful curves of the road winding down before us, the picturesque grouping of beeches on its right and of firs on its left, farm-fields and low woods in the mid-scene, and in the distance the face of Spruce Mt. (M. 2. 1 and 2) soft blue behind the firs, gray and rocky behind the beeches, and, peering over one of the hollows of its wavy outline, the fainter blue of the dome of Washington, now revealed, now hidden by drifted fleecy cloud: canopied over all, the deep rich azure of the skies; and flooding all, the half-summer, half-autumnal light of the brilliant sun.

This glory portfolioed, we pushed on, — leisurely enough, however, to hunt partridge in the copsewood by the roadside, to exhaust the dairy-pans of the farm-houses in quenching our thirst, and to lay the abundant corn and apples of their fields and orchards under contribution for refilling our shrunken haversacks.

Having passed the first of two gates that bar the road 8000 metres (five miles) and 8800 metres (five and one-half miles) above our starting point, we came in 600 metres to a cairn erected at the opening of a cart-path on the right. The travelled road ran off westward about 1700 metres (over a mile) up the ravine of the Little Wildcat, commonly called Little River. A hectometre of the cart-path brought us to the bed of this stream (here six metres wide), and to dinner: — a plump young partridge divested of its skin and broiled on forked sticks before the glowing coals of a fire flaming up amid the swift current itself; corn and apples, likewise toasted; then, a dessert of raisins, bread and butter, and lemonade.

Thus luxuriously dined, the explorers took up their march again along the convenient wood-road, and in nine hectometres came out, when travelling N. 40° E., upon a large clearing. Here Carter Notch, hidden during our passage from the

cairn through the woods, suddenly came into view away to our left, in a direction slightly west of north. Against the dark blue forms of the Wildcat Mts. and of the group of Number Sixes stood out the white and yellow-gray boughs of the few tall birches that rose, leafless, from the low brush in the foreground. In the gap and towards its left side the broad shoulder of Madison was thrown out behind the edge of the wall of the Notch, and formed a strong background for half the steep slope of Wildcat. Carter Dome was flattened into a slightly-elevated, toothed ridge. The boulders and ledgy precipices of its southern front thrust out their warning heads and faces yet more prominently than before: Wildcat's rounded form seemed tame in comparison with its opposite neighbor's rugged rocks, bristling fierce with stunted fir.

One of the problems for the exploring party to solve was this: is a route to Carter Dome by the east wall of the ravine down which flows a brook from G. 6. 2, feasible? and if feasible, is this way, by the western slope of the ridge connecting G. 6. 3, G. 6. 2, and G. 6. 1, to be preferred to 'circumventing' the forbidding southern face of Carter Dome by passing up to the wall of the Notch and around north-west of the obstacles we were approaching? Our decision was based upon the almost unanimous testimony of the experienced woodmen, familiar with the region, whom we had consulted in the village below and along the road, upon our own careful observation of the precipitous ledges which stretch across the south front of the mountain whose summit we sought, and are flanked at each end by immense heaps of huge boulders, and upon our equally careful estimation of the distance to the Dome by each route considered.

Somewhat reluctantly we determined to abandon the proposed eastern path and follow the usual fisherman's trail that winds up the narrowing valley of the Wildcat to the Ponds in the Notch. Rejecting at the Clearing a path on the left apparently leading towards the Notch but soon losing itself in a narrow tributary of Little River, and again, beyond the Wildcat (reached and crossed in 200 metres), another path leading to a logging camp, 200 metres on the right, we soon

found ourselves crossing and re-crossing the noisy stream at intervals varying from fifty metres to a thousand, discovering on the true right bank water undrinkable from its strong impregnation with iron and on the true left bank clear sweet pools and springs that bubble up in all save the driest times through blue-gray sand, noting the tall open forest growth, taking frequent observations for elevation with barometer and thermometer, and entering in our notebook records of walking-time and distances.

About 4000 metres from the road-gate, as we ascended a mound on the true left bank of the river 860 metres above the sea, the high wall of Wildcat (M. 1. 1.) stared out upon us through the slender tree trunks, bearing upon its face the scar of a slide, which, starting 300 metres vertically, from the top of the mountain, moved obliquely across its face along the edge of a huge precipice a distance of nearly 400 metres, and where the rocky rampart abruptly ended, 400 metres vertically from the crest of the mountain, fell off into the Gap below. This spot we marked for a clearing by the Department of Improvements. We likewise, both this day and the next, designated with the Club hatchet, at various points, the best route to be followed.

The first 3400 metres of travel from the road-gate, our grade of ascent had been 1 in 25; for the last 600, it had risen to 1 in 9. Now it rapidly increased, first to 1 in 4, and then to 1 in 3. An upward path of 100 metres led us for the last time across the river, here a narrow stream that one might o'erleap at a bound; and 50 metres up a steep incline, we drank of the headwater of the Wildcat, 880 metres above the sea. No stream is visible above ground higher up into the Notch than this spring, although the waters of the Ponds lying there drain in underground channels into the Wildcat valley.

Looking up from the deep shade in which we stood, we beheld, thrown sharply out from the bold front of the southwest spur of Carter Dome into the warm glow of the declining sun, a huge mass of pale brown rock, diamond-shaped. Of course somebody had named it pulpit-rock. We rechristened it Diamond Crag.

The slant light falling across its rough edges soon reminded us that sunset was not far off, and our prospective camp yet 500 metres away and 95 metres nearer the heavens than we were. We quickly mounted through low spruce, fir, and birch to a birch-bark shelter which the skilful woodman who had accompanied us from his home near the road-gate, had built for his own convenience whenever he came up to fish out, with interest, the once tiny trout he had brought up to stock the Ponds,—trout, by the way, not only enlarged in size, but with flesh changed in color to match the red mud bottom over which they now swam, instead of the white and light gray rocks of their former homes, the mountain brooks.

A line of blaze rising from a half-dozen 30-foot tree trunks lying side by side soon prepared a trout and potato supper for us, and us for sound sleep oblivious of the strong west wind that rushed in great gusts through the Notch and made fire more necessary than usual for those of us who, rolled in rubber and wool, were wont to lie in the arms of mother earth under roof of tree boughs or canopy of sky and stars.

Before morning the mercury in the thermometer had fallen to 39° F. We were 975 metres above tide-water in a wind swept gorge, with mountain walls 400 to 500 metres high, not 10 metres distant on the one hand nor 100 metres on the other. The barometric mercury had fallen .15 of an inch; the sky was clouding; and Carter Dome was not yet reached. Even the softest of fir couches on that breezy slope of Wild-cat would have lost its usual allurements for us. We were up betimes. At 5.47 A. M. packs were harnessed on, and in three minutes we had passed between the two Ponds—100 metres north-east of our camp and 10 metres lower—lying gloomy and rough under their high western rampart in the gray of the morning; blacker and more forbidding than even the thickly wooded front and crest of that rampart itself; a weird and unforgettable scene.

First leaving the summit line of the Notch upon our left, we soon turned our backs to it and took a circuitous course around the west edge of the massive boulders which strew the side of Carter Dome toward the Notch, Mr. Lowe, however, going through the heap, to prove it not absolutely impassable.

Having flanked these obstacles we made a steady climb of about 1100 metres up a grade averaging one in three, and came out, when travelling south-east, upon the edge of the south-west spur of the Carter Dome Group.

From the bold cliff on which we stood the outlook from south-west to south-east was lovely. Below our feet projected the threatening ledges of the southern face of the range, Diamond Crag standing out sharply from their precipitous front. Southward from the base of our fortress declined the fruitful valley of the Wildcat, pleasant farms bordering the stream, which ran down on its western side. No. 3 of the Carter Dome Group and the six knolls of Black Mountain (Jackson), in two triads, formed the undulating line of the valley's eastern wall. Nearer its foot rose the two crowns of Doublehead, just enough out of line to be distinguishable one from the other, their square forms nearly filling the central hollow in Black Mt. and thrown in firm relief against the flowing slopes of graceful Kearsarge. Beyond a glimpse of Saco intervale, the eye rested with a sense of satisfaction upon the noble bulwark of the Moat protecting Iron Mt. on the south, while Crawford, Resolution, and the Giant's Stairs guarded its treasures on the right and rear. Eastward, over the ridge from which G. 6. 3 rises, Baldface and its less barren comrades kept watch over precious vistas of Maine valleys and streams, sparingly revealed between their summits.

More distant peaks we had not time to note with certainty. Our landscape feast must be brief. We have thirty minutes more of stooping through thick fir, playing Indian on all fours under the stout branches, and then we come to an eminence which might have been mistaken for the summit of Carter Dome, had the now descending clouds already settled upon the mountain, and were not the expeditionary corps thoroughly persuaded that Carter Dome is a dome. The true object of our search yet lifted its head full fifty metres above us. Quickly we ran through the brakes of the intervening hollow, about five metres deep, and up the round slope beyond, a distance in all of 500 metres.

We stood on Carter Dome! South, west, north, east, we beheld the whole sea of hills stretching wide around us.

The sharp walls of Tuckerman's Ravine appeared through a hollow gouged out in just the right spot on Wildcat. The great spurs of Washington; all the Presidential peaks; the Great Gulf, with the bold braces of the northern summits projecting into its depths and visible from base to crest; the rolling slope of Madison northward; the long procession of the Carter and Moriah ranges at whose head we stood; beyond, Speckled Mt.'s table aslant and mounted by the sharp cone of intervening Goose-Eye; a multitude of lesser companions among these mountain forms, and far reaches of rolling landscape;—all these elements were now added to our view from the south-west spur, and the boundaries of that view itself were set back so as to include Carrigain, Tripyramid, Chocorua and other southern chiefs. The landscape was nowhere weak or tame, and was open enough, and the most interesting mountain forms were remote enough, for good pictorial effect. We had visited no point so favorable for studying the strong buttressing of the Great Range along its south-eastern faces, or the mountain groups east of the valleys of the Peabody and Ellis. We were 1470 metres above the sea, not far below the level of Star Lake, the southern plateau of Adams, the Lakes of the Clouds, Boott's Spur; and looked directly in upon the site of our camp on the eastern vestibule of Clay across the tremendous amphitheatre whose circuit of nearly eight kilometres we had almost completed.

But the clouds were still coming down. They already obscured the peaks of the Great Range, touched lower summits north and east, and threatened to swoop down into the ravines. Driven before the swift north wind they were scudding close over our heads. There must be quick work with eye and pencil, barometer and thermometer, match and axe and hatchet. In a half-hour we sketched what remained of the prominent outlines in the landscape, commanding the eye to remember what the clouds were too fleet for the pencil to catch; noted our instrument indications thrice; felled twenty 12-foot trees; bushed out the tallest, bound part of its top with a sacrifice of white cloth, and lashed its trunk to the top of the next in height; wrote our record, warning our

fingers by the fire we had kindled when they got too numb for writing; bottled our record (alas! that the Councillor of Improvements was there and had no authorized bottle in his pocket!); searched diligently but in vain, for tokens of predecessors, — the stubby firs had not grown with mark of knife or axe or other sharp tool upon stunted trunk or blunted branch, and there was no sign that any pre-human visitant knew aught of script or print whereby to record his ascent for the benefit of our later bottle-placing civilization.

Then we ate sparingly of our now scanty store of provisions, pocketed the balance, and when it had rained ten minutes and the mercury was approaching 36° F., and, like drops let down to shift the scene upon a stage, the clouds, lowered by invisible cords, quickly fell between all the hills and we might not reach their lower edge until we had travelled two or three kilometres below the Dome, then we said good-bye and pushed fast slantwise down the slope of the mountain towards the head of the great slide, 80° west of south from our signal-tree. In twenty minutes we had gone over the 1200 metres of hillside between our clouded summit and the top of the "hopper," down whose sharp hollow the slide had slipped on that day of flood and storm, Oct. 4, 1869, when Mr. Thompson, the former proprietor of the Glen House, lost his life in the torrent that upturned the mill on the Peabody. Our readers will recall that autumn as the one in which yet another tremendous storm swept New England and was followed by an active earthquake.

From a point about 600 metres by ground measurement and 170 metres vertically below the false summit we have mentioned, the slide descended north-north-west, 300 metres, dropping, meanwhile, 110 metres; then fell 140 metres in a course of 400 metres due north; next moved 500 metres west-north-west, descending 110 metres; and stopped its career of destruction 100 metres below, after having swept, for the larger part of its last course of 700 metres north-north-west, an unbroken ledge, ranging from 30 to 60 metres in width, perfectly bare, and piled up at its foot no small share of the more than 80,000 square metres (20 acres) of rock, soil, and forest growth which it had loosed from their moorings.

At the upper part of the slide its bed was so steep and rough that we were glad to avail ourselves of the ridge, seen from the head-wall of Tuckerman's Ravine, which runs north-west down the mountain and meets another ridge, visible from Mt. Adams, which passes from north-east to south-west, and above which a small slide came to meet the main slide at its base. Here the water that set the earth to moving passed into the ampler part of the channel of Nineteen Mile Brook, the chief branch of which follows the course of the great slide from its beginning.

The greatest angle of descent, 42° , was found in the upper and lower of the four sections of the slide, and the least angle, 18° , in the third section from the top. The minimum widths in the four sections were 10, 15, 20, and 30 metres; and the maximum widths, 15, 20, 30, and 90 metres. The minimum depths from the top line of denudation were 15, 10, 5, and 3 metres; and the maximum depths, 18, 15, 10, and 10 metres.

The terminal 'moraine' of the slide being surmounted, the vestiges of turmoil and wreck, through which we had been making a rough and difficult descent for two hours, gave place to the picturesque boulders and limpid pools and miniature cataracts of the brook-bed unswept by earth-avalanche and overhung with graceful sprays of beech and alder, hemlock and cherry. We had left camp with but a pound of raisins and a pint of peanuts for our day's provender; there were four of us. We were a-hungered. Tiny case-worms dwelt in their cones of shining mica at the bottom of the pools. They were easily unhoused and attached to our fish-hooks. Poles grew abundant by the brook-side. Thus furnished we soon whipped a baker's dozen of sweet trout from the still, dark, emerald basins under the shadow of the boulders from edge to edge of which we were leaping down the stream.

At the aqueduct we took the path to the Glen House; at that famous hostelry, received from its proprietor promise of generous assistance in opening a path to Carter Dome; at Mr. Callahan's, consumed several bowls of bread and milk; then soon met Tad, who ingloriously buckboarded us veteran pedestrians of a week's climbing to our Randolph and Jefferson homes.

In our exploration we had obtained, as herein recorded in part, figures of distance, elevation, and location, by frequent use of barometer, thermometer, ten metre line, compass, and notes of walking time. We had secured additional evidence bearing upon a few practical questions in mineralogy and geographical botany. We had visited regions, in our second day's tramp, not before carefully observed, if at all. We became convinced that the route followed was the best for pedestrians going north, but that Carter Dome should be approached from the Glen by keeping on the left bank of Nineteen Mile Brook to the foot of the slide and then, on a more southerly path, ascending to near the Ponds, and thence up the mountain in our footsteps. We were satisfied that Carter Dome has been thus named by the Club with singular appropriateness. For, from all points of the compass, save, perhaps, from low levels in that quarter from which it is least likely to be viewed, this noble mountain appears as a *DOME*; and one standing on the supreme arch of its curve sees the lines of descent gradually and evenly fall away on every side, and feels the spring of its strong broad vault under his feet.

For illustrations of this paper the reader is referred to Mr. Morse's effective drawings of Carter Dome and its vicinity embraced in the Views from Mt. Kiarsarge, or Pequawket, and from Mt. Washington which are published in Osgood's White Mountain Guide Book. In the former, G. 6. 2 diminishes to a small but sharp knob, and G. 6. 3 appears near the end of the long thin ridge on the right. In the latter, G. 6. 2 presents the form seen in the middle sketch in Plate V of this number of Appalachia; and the ridge between the slides in this sketch comes out in the guide book view. The unshaded mountain behind Wildcat (Plate V) is North Baldface.

The sketches reproduced in Plate V were taken by the writer during the expedition to which this paper is devoted, and have been drawn approximately to the scale of 5 mm. to a degree for the upper and middle ones, and 2.5 mm. for the lower one. The stand-points were respectively about 11, 10, and 4 kilometres from Carter Dome. The original sketches included many other mountains, but only those lines are re-

produced which directly illustrate the subject of this paper. Complete sketches were also taken from Mts. Madison, Adams, and Jefferson; but the use of these is rendered unnecessary by the accurate view from Mt. Adams which the topographical camera of Mr. J. Rayner Edmands has furnished. In this view, the upper drawing in Plate VI, Sable Mt. appears through the Notch with the long line of Pleasant Mt. behind it. Doublehead will be recognized over Wildcat; the Gemini on the north-east side of P. 1. 1 are in sight, and we just miss including the latter summit. The peak to the left of G. 6. 2 in this view and in the upper sketch in Plate V is probably one of the Carter Dome Group, but has not been positively determined to be such.

Distant Points Visible from Mt. Washington.

BY W. H. PICKERING.

Read October 11, 1876.

If an observer were to go up four particular peaks in the White Mountains, he could see all the distant points visible from any of the other summits, together with a good many more not visible from them. These four peaks are Washington, Moosilauke, Passaconaway, and Lafayette. I name them in the order of the extent of the distant views obtained from them alone. Now looking at the subject the other way, no matter from what distant point the White Mountains are seen, one of these four peaks must always be the most conspicuous object in the view, provided no near hills intervene. By means of the following formulæ the distance visible from any mountain may be readily calculated, and also the elevation a mountain must have in order to see a certain distance: $d = \frac{1}{10} \sqrt{175h}$, $h = \frac{1}{4}d^2$, where d = distance in miles, and h = elevation in feet. They may also be used to calculate mountain profiles as seen from distant points. In this connection I may add that there is a slight inaccuracy in the Guide Book relating to Chocorua. It says: — "It is the noblest peak in all the view from Washington, and lifts its white pyramidal

ledges far into the sky, flanked by bare supporting ridges." This must be a rhetorical hyperbole, for it is not at all true. And far from lifting its pyramidal ledges into the sky, it does not even come up to the level of the horizon, by 420 feet.

For some time there has been a question whether Katahdin were visible from Washington or not. It is 163 miles distant, and would be the most distant point from which the White Mountains could be seen. According to calculation 3500 feet of it should be visible if the land between were on the level of the sea. Now the horizon line as seen from Washington passes five to ten miles south-west of Moosehead Lake. Moosehead Lake has an elevation of 1023 feet above the sea. Now allowing the land five or ten miles below it, measured on the river, to have an elevation of 1500 feet, Katahdin would still rise 1170 feet; and it would require an elevation of 2300 feet to hide it. Moreover, on remarkably clear winter days a very distant mountain has been seen in about the right direction, with a very peaked summit, which coincides with the descriptions of Katahdin. I should add, however, that as seen from Moosehead Lake, which is in much the same direction, Katahdin does not present this appearance. It is claimed by some that Katahdin is visible from Kiarsarge, and there is a distant mountain visible from there on rare occasions, which I have seen once, but which is not in the right place. And moreover, if there was an elevation between them of 390 feet above the sea, and near Mt. Blue, Katahdin would be hidden. Now, as all the country near Mt. Blue has an elevation of something over 1000 feet, it seems rather improbable that Katahdin should ever be seen. As to seeing it from Osceola as some claim, one would have to look something like 100 feet below the sea horizon to see it.

The following is a list of some of the more interesting distant points to be seen from Mt. Washington, many of them being visible only on rare occasions.

Mt. Belœil; distance 135 miles, position north 45° west, and nearly over Prospect Hill, Lancaster. It is quite a high mountain near Montreal, and is said to be visible.

Lake Memphremagog; distance 70 miles, position north

40° west, and over Jefferson Hill. It requires a very clear day, as distant water is difficult to distinguish.

Mt. Carmel; distance 65 miles, position north 10° east, and just over Mt. Adams. It is very near the northern border of Maine, and is readily recognized by the steep slope on the eastern side. It is said that a very fine view may be obtained from it.

Mt. Bigelow; distance 70 miles, position north 35° east, and nearly over Mt. Hayes. It appears as three rounded hills. Just to the south of it and far beyond is a mountain with a very sharp apex, which is sometimes called Katahdin, but this is a mistake.

Mt. Abraham; distance 65 miles, position north 40° east, and somewhat to the right of Mt. Hayes. A long serrated ridge, also sometimes called Katahdin.

Mt. Katahdin; distance 163 miles, position north 45° east, and about half way between Mt. Hayes and Mt. Moriah. It is said to appear rising over a nearer saddle shaped mountain, and to be recognized by its sharp peak — the sharpest in all the view from Washington. If visible at all in summer, it would be far the faintest object in sight in that direction.

Mt. Blue; distance 57 miles, position north 57° east, and half way between Surprise and Moriah. It is quite a conspicuous pyramidal peak, and is near Farmington, Maine. It is used as a Coast Survey Station.

Portland; distance 65 miles, position south 51° east, and over the northern summit of Doublehead. It appears as a low white hill, with a long light blue line beyond it. With a telescope the hill resolves itself into a mass of closely packed white houses, and the blue line is seen to be thickly studded with sails. The ocean, however, is not as often seen as some more distant objects in other directions, partly on account of the difficulty of distinguishing distant water, and partly because the atmosphere in this direction seems generally to be somewhat thicker than elsewhere.

Lake Sebago; distance 43 miles, position south 48° east, and over Mt. Gemini. It is 14 miles long, and about 11 wide.

Mt. Agamenticus; distance 80 miles, position south 24°

east. A flat rounded hill of considerable height in the southern part of Maine, and forms a conspicuous landmark for sailors.

Isles of Shoals; distance 97 miles, position south 22° east. They are very difficult to see, and are situated on the horizon just to the right of Agamenticus.

Mt. Uncanoonuc; distance 92 miles, position south 9° west, and half way between Mts. Crawford and Passaconaway. Twin summits near Manchester.

Mt. Wachusett; distance 126.5 miles, position south 13° west, and just to the right of Whiteface, if it is visible.

Mt. Monadnock; distance 104.5 miles, position south 22° west, and a little to the right of Sandwich Dome. A very regular rounded summit.

Mt. Kearsarge; distance 70 miles, position south 24° west, and half way between Sandwich Dome and Carrigain.

Mt. Greylock; distance 147 miles, position south 40° west, and just over the summit of Mt. Webster. It has a pointed summit and is situated in the north-west corner of Massachusetts, near the Hoosac Tunnel, and is the highest mountain in the State, being 3500 feet high; or about the same as Chocorua. It is extremely difficult to see, as it is, next to Katahdin, the most distant point visible. The Guide Book says it is 160 miles distant; this, however, is an error.

Mt. Ascutney; distance 85 miles, position south 45° west. Situated in Windsor, Vermont, close to the Connecticut River.

Kilington Peaks; distance 91 miles, position south 59° west, and between Mts. Liberty and Blue. Twin peaked summits near Rutland, Vermont.

Camel's Hump; distance 80 miles, position north 87° west, and just over Bethlehem Street. It is a striking looking mountain, shaped like a truncated cone, with very steep sides. Readily visible at sunset on a clear day.

Mt. Whiteface; distance 130 miles, position north 86° west. It is just barely visible, hardly rising above the right hand slope of Camel's Hump. This is one of the highest of the Adirondacks, rising to a height of 4900 feet. Two lower peaks are seen just to the right, and three more some distance to the left. These however have not yet been identified, but

if Mt. Marcy and any of the other higher summits are visible, they should appear about 7° to the south of Whiteface and nearly over the Fabyan House.

Mt. Mansfield; distance 78 miles, position north 78° west, and between the Twin Mountain House and Mt. Deception. It is the highest of the Green Mountains, being 4300 feet high, and appears as a long ridge bearing a fancied resemblance to a human face.

Concerning the Name of Black Mountain.

BY CHARLES E. FAY.

Read October 11, 1876.

Equally with Kearsarge (Pequawket) the noble western member of the so-called "Sandwich Range" stands before our Club with an "*alias*," and the question confronts us, whether we shall lend our associate influence to keeping before the public its true name, or join in the attempt to bestow upon it a title until recently unheard of.

In the notable case of the former mountain there is a presumption that the two names have been applied to it since colonial times. In the warm discussion each side seeks to establish by documentary evidence the priority of name. No one admits that the chief reason for preferring Pequawket to Kearsarge is, that otherwise we have two mountains of the same name. On the merits of this case the Club is in doubt. But here is a grander mountain, higher by the better part of a thousand feet than the pride of Conway, concerning whose name there never has been, nor indeed *is*, the least doubt, which we are asked to help rechristen, because there are lesser mountains in the State, of slight local fame, bearing the same name.

The position of the Club with regard to names stands on record in the resolutions of July 26th, as follows:

"Resolved: that while the Club feels the necessity of having definite and unambiguous names for the mountain peaks, it disclaims all intention and desire to interfere unnecessarily with well-known names of mountains."

“Resolved: that in giving names to natural objects hitherto unnamed, and in selecting among several names applied to the same object, the Club desires to pay the fullest respect to the local preferences of the inhabitants, recognizing them as the persons most interested in the subject.”

The first resolution implies a possible *necessary* interference; necessary of course so far as the Club is concerned; necessary as regards especially the elimination of all unscientific ambiguity. By the adoption of our official nomenclature such necessity is reduced to a minimum, if not abolished. In the case in point we have but to speak of the mountain as Q. 8, or Black Mt. (Q) and all ambiguity vanishes. The inconvenience otherwise is comparatively trifling, especially with respect to this peak, which so far surpasses all the others as to be Black Mountain *par excellence*.

The second resolution suggests that the local preferences of the inhabitants shall be consulted in deciding between several names. I know not how the people of Campton, Thornton, Waterville and Sandwich, a numerous constituency, would regard the proposition, but am convinced that few, if any, ever heard the suggestion of a new name for the Black Mountain of their fathers and grandfathers. To quote from the new guide book, which nevertheless, with the N. H. State Geological Survey, accepts Professor Guyot's proposition to call it “Sandwich Dome”: “This mountain is known to *most* of the country people of the adjoining towns as Black Mountain.” I fancy those who do not so know it belong to the class from whom the inquisitive stranger asks in vain for information.

But if the necessity were imperative and the local preferences feeble, the new title suggested by the eminent geographer is inappropriate.

Reverting to comparison — how would it do to call Kearsarge Bartlett Dome? The case is parallel. The lesser fraction of that mountain lies indeed in Bartlett, the greater in Chatham, while its most intimate relations are with North Conway. The chief mass of Black, including its three highest summits, lies not in Sandwich but in Waterville. But the only path to its summit is from the Campton-Thornton

side, and to these towns it possesses the greatest interest. Kearsarge is indeed a cone — in its characteristic aspects at least. But from what standpoint can Black Mountain be viewed from which its figure so nearly approximates to a dome as does a cone?

In the first place there are two summits of nearly equal height, with a slight but well marked depression between, lying along a northeasterly and southwesterly axis and about an eighth of a mile apart. From a standpoint out of the general line of this axis, except there be foreshortening, both summits must distinctly appear. From the Pemigewasset valley indeed, its most attractive aspect, one summit only is seen soaring gradually upward in a flattened but graceful pyramid from its sturdy buttresses. The two summits crown an immense irregular mass, sending off ponderous spurs to the southwest, southeast, north (Noon Peak) and northwest (Jennings Peak), this last connecting with a lower, but bold and most picturesque subordinate range, trending still farther west. One can infer that the term 'dome' could scarcely apply to such a mountain.

It might be urged that the qualifying term "Sandwich" is derived not directly from the township, but secondarily from the general name of the range. This is itself, by the way, a misnomer. Not one of the several peaks forming the range lies in that township. Black Mountain indeed, with the fractional portion above mentioned, has more bulk within its limits than all the others combined. But if this were the origin of that term, then there exists a yet stronger reason for rejecting the word "Dome." In this range is Passaconaway, one of the most perfect, symmetrical domes in all the mountain region, presenting that striking outline to the lake country from which the range is best seen, whose proximity would ever emphasize the inappropriateness of its grand neighbor's title.

NOTE. Profiles showing the outline of Black Mountain, or its upper section, from four directions may be found among the illustrations appended to this number (Plate IV). Being intended merely to illustrate the form, none of them are drawn to scale. I, III, and IV are from sketches made by

the writer during the past summer. II is from a stereoscopic view by Mr. Young of Campton. Explanatory notes accompany them. It may be added, that the dotted line in I represents the demarcation between the original growth of dark spruces and the second growth. The latter covers nearly all that is shown in I, save what lies to the left of and above the dotted line on the main ridge. The zig-zag line below marks the course of the East Branch of Mad River. The figures 1 — 8 are the secondary numbers, Q. 8 being suppressed for the sake of brevity.

A Descent through King's Ravine.

BY J. RAYNER EDMANDS.

Read Oct. 11, 1876

Those who have read Starr King's "White Hills" will readily recall his description of an ascent through the ravine which now bears his name. It is included between two great spurs which sweep down toward the north from the shoulders of Mt. Adams. These are seen in profile from the town of Jefferson; but from Randolph Hill the ravine opens wide before you, and one wonders how the head-wall could ever be scaled.¹ Just where it promises to be the hardest climbing, however, the way seems to have been graded for the particular convenience of pedestrians, while a massive gateway marks the boundary between rugged ravine and exposed mountain-side. It was in emerging from the ravine at this point that Starr King obtained the view of Mt. Madison to which he refers as so striking.²

The sixteenth of last September found two of us at this

¹ See illustration in "White Hills," page 353.

² King's Gateway and the summit of Madison beyond, are shown in a camera profile (see Pl. VI) drawn at a point on the spur west of the ravine, not far below the path to the summit of Adams. A cairn marks the spot, but the conformation of the mountain allows one to come very near from some directions without discovering it. There are several illustrations in the "White Hills" (pp. 359 to 365) which also relate to this vicinity.

gateway at half past three in the afternoon, preparing for the rough work ahead, and watching our companions of the forenoon, as they receded over Nowell's Ridge along the established path. We could not delay to do full justice to the interesting objects about us. On the right as you face the ravine is a precipitous wall, upon whose side large masses of rock are half dislodged and nearly ready to make their headlong plunge. On the left is a huge inclined plane of smooth ledge, down which many rocks have been hurled to lie in fragments below. At the junction of this ledge with the base of the cliff runs the gravelly incline by which we descend.

But our way is not a succession of smooth slopes. It soon bends to the right, taking more nearly the direction of the ravine, and passing over large rocks and outcropping masses of ledge; so that if one has a bulky pack on the back¹ it is impracticable to slide quickly from a seat on one rock to a footing on the next. Then comes the much dreaded alder, clearly discernible from above; but the sight of it gives us no concern; for have we not all the way down seen little piles of three stones with a white one at the apex? And our Appalachian instincts are right, for the signals point the way to as good a cutting through the alders as one could ask for.

Thus we descend what I have called the head-wall, at an average inclination of a trifle less than 40°. Below this everything is different. Large boulders appear to have come from above and to have collected to form a barrier across the ravine. Indeed, so large are they that it is impracticable to climb *over* them,—so we go *under* them. It is equivalent to passing through a series of caves; and at least one of these is cold enough to keep ice till September through as hot a summer as the last. To carry a large pack through on the back is impossible; so my companion, Mr. John Crawshaw of the Mt. Adams House, would first crawl through an opening, and

¹ It is but justice to myself to explain here that the rash attempt to carry through the ravine in a short afternoon the camera, with which I had been drawing on Nowell's Ridge, was due to a misunderstanding. Mr. Lowe, the guide, had explored from the foot as far as the rock barrier, and had reported it easy travelling; but I understood that he had been to the head wall.

then my pack would follow by hand; — a feeble imitation of Nash and Sawyer, pulling the first horse through Crawford Notch. But the rate of our progress was also suggestive of the delights of spending the coming night in the ravine.

Just below the caves and at the commencement of the descent from the barrier of colossal debris, the path turns abruptly to the right and enters the low growth of timber on the east side of the ravine; but we perversely overlooked the signals and had some very rough work with more waste of time before regaining the path.

Starr King thus speaks of the ascent of this part: —

“From the point I have thus been speaking of, just above the line of high trees, it seemed as though we could reach the summit of the ridge in two hours. But here we found the greatest difficulty of the whole excursion. The slope was not very steep; for a mile or more, the bottom of the ravine was rather a gradually retreating stairway of enormous boulders; and, as an Irishman remarked in ascending the cone of Mount Washington, ‘the dumpers did their work very badly.’ The huge rocks were piled in the most eccentric confusion; crevasses, sometimes twenty and thirty feet deep and spanned with moss, lay in wait for the feet; thickets of scrub spruces and junipers overgrew these boulders, and made the most sinewy opposition to our passage. Every muscle of our bodies was called into play in fighting these dwarfed and knotty regiments of evergreens. A more thorough gymnasium for training and testing the working and enduring powers of the system, could not be arranged by art. After six hours of steady and hard climbing, — which, added to three of the afternoon previous, made nine hours of toil in scaling the ridge, — we gained the plateau above which the pinnacle of Adams soars.”

Meanwhile our companions of the morning, making their way home over the more civilized path, had met a party of woodsmen headed by Mr. Lowe, who had just returned from their pioneer work in the ravine. And as Mr. L. thought we had started rather late to battle with the obstacles he had

found there, he immediately retraced his steps in company with one of his men. So their voices soon greeted our ears; and we well knew whom we heard, for we had expected that the whole chopping party would camp in the ravine instead of finishing their work in a single day.

Thus seven o'clock found four of us supping at the waterfall, having accomplished a large part of the vertical distance, but still over four kilometres, or two and a half miles, from the road; and at that hour of the evening in the middle of September it is quite dark in a wooded ravine not opening toward the west. But were any of you ever in a difficulty in the woods in company with an experienced woodsman, when he did not adopt some expedient that would not have occurred to you? On this occasion these men, returning to our rescue, had stripped bark from the birches, and had strewn it in the path, so that by the aid of a brilliant torch, kept well supplied with fuel, we were able to push onward nearly as fast as we should have done by daylight.

For something over a kilometre, or perhaps three-fourths of a mile, the path descends along the east side of the ravine; then it crosses the stream (West Branch of Cold Brook), takes a more nearly horizontal course, traverses a depression in the spur west of the ravine, and joins the path up Nowell's Ridge at a point about 2.25 km. (1.4 miles) from the road. We reached the road at 9.20 P. M.

The credit for the path through King's Ravine belongs to Mr. Chas. E. Lowe of Randolph, and I am happy to bear witness to the thoroughness with which the cutting has been done. Of course it is not yet an "Appalachian path," but our Councillor on Improvements, who stimulated the zeal which led to its construction, will readily appreciate its value in connection with the path already established, and he will undoubtedly take steps to put it into approved condition as soon as practicable.

The Application of Photography to Mountain Surveys.

By J. B. HENCK, JR.

Read Nov. 8, 1876.

In mountain surveys as a rule we do not require, in fact have no possible use for, the extreme accuracy obtainable by the most refined methods of trigonometrical surveying, such as are necessarily used by the Coast Survey. It is necessary for the Coast Survey to produce charts which will stand the test of accurate astronomical observations without any appreciable error. On the other hand, maps of mountain regions have generally to stand no severer tests than can be applied by the unaided eye of the traveller, who seldom has any special skill in detecting mistakes. If the map enables him to find his way about the mountains, and to identify the various features of the landscape and the objects of interest by the way, it is all he cares for. Hence in making such a map it will be better, instead of the laborious and costly methods of the Coast Survey, to employ methods demanding less time and expense, even though by so doing we sacrifice a considerable degree of attainable accuracy in the result. It was this consideration which led me to employ the simple radiating plane-table which I described to the Club last Spring,¹ and which led a committee of the Club to recommend the use of a similar instrument instead of a theodolite in determining the secondary stations of the proposed survey of the White Mts. I wish now to describe a method by which even the comparatively small amount of labor in the field which this instrument requires may be very much lessened, while at the same time greater certainty in the result and a vastly greater amount of material are secured. This method consists in the substitution of the process of photography for the eye and hand of the observer.

The first experiment in this direction was to take photographs in the ordinary way, simply setting a common photographic camera so that it should point successively in directions making a known angle with each other, until the

¹ See page 26.

series of pictures included the whole horizon. This method was used in some French military surveys with very satisfactory results. The camera used was very small, the lens having a focal length of only 10 cm. and the pictures obtained being only 5 or 6 cm. square. This made the apparatus light and easy to carry, but such small pictures only sufficed for determining points within a very short distance. The great objection to this method is that it requires a great many plates, which if they are to serve for determining points at any considerable distance must be large and must be taken with a lens of considerable focal length, so that the apparatus becomes very expensive as well as cumbersome. Then the time and labor required in taking the pictures are too great for the purpose of a mountain survey, and when we come to make use of the pictures in the construction of a map we find it necessary to make very careful measurements of them and of the focal length of our lens, and to apply troublesome corrections for the distortion of the image. A considerable portion of the time and labor of taking the pictures may be saved by taking the successive pictures all on one plate, but this is only possible when the pictures are quite small. The next step was to make the instrument automatic, so that when turned into successive positions the plate or the lens would be shifted so as to expose a fresh portion of the plate to the light.

The greatest improvement however was the invention of an instrument by which a single continuous picture could be taken including the whole horizon. The first instrument of this kind was designed to meet only artistic requirements. It consisted of a camera mounted on a vertical axis about which it could be caused to revolve by clockwork. The sensitive plate was covered by a screen having a narrow vertical slit in the middle of it, and as the camera revolved the plate was moved slowly past the slit. It therefore received in succession the images of the objects toward which the camera was pointed, so that a panoramic picture was obtained in which horizontal distances were proportional to the angles between the objects at their extremities. Such a picture could be used in constructing a map much more easily than

the series of pictures obtained in the ordinary way. It would correspond in fact to the profile sketches made by Mr. Edmands's camera, which are likely to play an important part in the construction of our map. The pictures made in this way, however, must be on a small scale, or the plates, and in fact the whole apparatus, will become so large as to be unmanageable as well as being very expensive.

Still this method would be very useful if there were nothing better. A much simpler and more convenient instrument, however, has been invented by M. Chevallier, of Paris, for the express purpose of making rapid surveys. It is known as the photographic plane-table, and is nothing more nor less than a radiating plane-table in which the registration is effected by photography. The sensitive plate is circular and lies horizontally, while the optical system, consisting of a lens and right angled prism for forming the image and reflecting it downward upon the plate, revolves over it. The plate is covered by a screen in which is a radial slit crossed in the middle by a hair which marks the horizon. By this arrangement the images of objects lying in successive vertical planes, passing through the axis of the lens, are thrown upon successive radii of the circular plate; so that we get a picture similar to the sheet from a radiating plane-table excepting that instead of a series of lines drawn by hand toward a few prominent objects, we have a photographic picture of every detail of the landscape, each in its proper angular position around the centre. Of course the picture is distorted, having the outside more spread out than the parts nearer the centre, but this is of no consequence in the drawing of a map, if only the various objects can be recognized, as they can without difficulty. It is of course necessary to work on a rather small scale in the field, but photographs, unlike drawings, will bear enlargement to a very considerable amount, so that the size may be increased if necessary for the final drawing. The expense is of course greater than that required by the use of the plane-table, but in return we get a vastly greater amount of material with less labor, and moreover avoid the possibility of a mistake. In using the plane-table we are continually at a loss to identify or name points that we see,

and often have to resort to rude sketches as a means of designating the points observed, while here we have an accurate representation of every point visible, and moreover are in no danger of omitting anything. The result, too, is independent of the observer's knowledge or ignorance of the points observed, the record remaining for future discussion and use by persons who may be more familiar with the ground than he. The actual plotting of a map from these plates would of course be done in the same way as from the sheets of the radiating plane-table, and would be as simple as possible. Then these photographic plates can also be used for drawing contours, since they show the elevation of every object as well as its direction. I think, in view of these advantages, that if any one were willing to incur the necessary expense, an amount of valuable material might be obtained with comparatively little labor which would amply repay the expenditure.

I am indebted to Prof. W. R. Ware for the use of a pamphlet entitled *Applications de la Photographie aux Levés Militaires*, par Mons. A. Jouart, from which most of the material for this paper has been derived, and also for the specimens of the work of M. Chevallier's instrument shown at the meeting when this paper was read.

The Flowering Plants of the White Mountains.

By J. H. HUNTINGTON.

Read Jan. 10, 1877.

The flora of the White Mountains has always excited the liveliest interest both on account of its Arctic character and the rare beauty of some of its flowering plants. Some of the earliest explorations of the mountains were made by persons who went thither in search of botanical treasures, and their names have been handed down to us in the specific names of the Alpine flora and the deep gorges of the mountains. Cutler's willow, and Peck's geum, Bigelow's Lawn, Oakes' Gulf, Boott's Spur and Tuckerman's Ravine will be known as long as the mountains themselves have a name.

To follow in detail the exploits of these early explorers

would be a pleasant task, if for no other reason than to testify to the thoroughness with which some of them did their work, but time permits us to notice them only in a general way. The first scientific party visited Mt. Washington in July, 1784; it consisted of Rev. Manasseh Cutler of Ipswich, Mass., the Rev. Daniel Little of Kennebunk, Me., both of whom were fellows of the American Academy of Arts and Sciences; besides these there were five others, of whom Dr. Belknap, the early historian, and Dr. Fisher of Beverly, did not reach the summit of the mountain. The results of their explorations are recorded by Dr. Belknap in his history of New Hampshire, and he quotes from Dr. Cutler's manuscript, who distinguished only the general botanical features of the mountain.

In 1804 Dr. Cutler made his second visit to the mountain, and with him was W. D. Peck, who was afterwards professor of natural history at Harvard. Dr. Peck made a collection of the Alpine plants, which were afterward described by Pursh in his "Flora of North America" printed in 1814.

In June, 1816, a third scientific party visited the mountain. It consisted of Dr. Bigelow, Dr. Francis Boott, and others. In July of the same year, Dr. Boott made a second visit. An account of the expeditions of 1816 was published in the New England Journal of Medicine and Surgery for December of that year.

Then came William Oakes, of Ipswich, Mass., the most enthusiastic and persistent of all the explorers. He collected in 1825-26 and again in 1843, and continued each summer until his death. From every nook and corner of the mountains he collected the phænogamic flora, and he preserved the plants with religious care. So precious were they that he did not distribute them even among his friends, and it was not until after his accidental death that botanists were able to obtain a single specimen of his vast collection. In the study of the cryptogamic flora Dr. Edward Tuckerman year after year sought these mountain heights, followed the streams of every ravine, traversed the ridges, and climbed the mountain summits. His study of the lichens has made his name known the world over. He collected from 1837 to 1840, then

from 1842 to 1853, spending each year several months among the mountains. Since Oakes and Tuckerman made their collections there has probably been scarcely a year but that some one, more or less acquainted with botany, has visited the mountains for the purpose of collecting plants, but always with varying success, dependent on the weather, the length of time they remained, the part of the season they were there, the knowledge they had of localities, their acquaintance with plants in general, their sharpness of vision, and, last but not least, their physical endurance.

For example, as about the average, I might mention a gentleman from Rhode Island, who visited the mountains three times during the summer of 1876, and yet failed to secure nineteen of the species in the collection made by us, though these were obtained in two visits, except two specimens that came from Franconia.

It has come to be somewhat of a habit with me to visit Mt. Washington semi-annually, generally in June and December. When forming my plans last spring for going to the mountains it occurred to me that a collection, especially of the early plants of the mountains, was something very desirable. After consulting with Mr. Wm. F. Flint, who has a more thorough practical knowledge of the phænogamic flora of New Hampshire than any one who has ever studied it, we concluded to spend a few days on Mt. Washington and collect plants. We reached the summit of the mountain June 26th, and remained until July 4th. This gave us six working days, and in that time we found fifty-six different species of Alpine and Sub-Alpine phænogamic plants. Of most of these we collected fifty specimens each. July 5th, Mr. Flint obtained three species about the Notch. Subsequently, I collected several specimens of the latter plants on Mt. Washington and two species in the Franconia Mts. So in all we obtained seventy species. The following, that have been found or are said to have been found in the vicinity of Mt. Washington, we did not get: *Potentilla frigida*, *Calamagrostis Pickeringii*, *Gnaphalium supinum*, *Triticum violaceum*, *Saxifraga rivularis*, *Sibbaldia procumbens*, *Dryas integrifolia*; the last two were not seen either by Mr. Oakes or Professor Tuckerman.

We found two species, *Poa cæsia* and *Hierochloa borealis*, that have not been seen by those who have studied the plants of mountains. Had we been able to spend a few days on the mountain the last of July, we should probably have found some if not all of those that have been found by previous collectors, though I suppose it is possible that some of them may never be found there again.

Among the plants that are quite rare I might mention *Silene acaulis*, *Arctostaphylos alpina*, *Rhinanthus Cristagalli* and the *Polygonum viviparum*, all of which are found on the eastern border of the Alpine Garden. *Oxyria digynia*, one of the exceedingly rare plants, is found in Huntington Ravine. *Rubus Chamaemorus* is confined to the ridge south of Mt. Pleasant. *Salix herbacea* is not common, but can be found in the vicinity of the Lake of the Clouds; *Poa cæsia* grows on Mt. Willard.

Calamagrostis Langsdorffii is quite abundant about Eagle Lake on Mt. Lafayette, though exceedingly rare elsewhere; *Pyrola minor* is found growing under the dwarf firs, just before we reach the limit of the trees on Mt. Washington. *Viburnum pauciflorum*, though found in Tuckerman's Ravine, is rare. *Abies Fraseri*, Fraser's balsam, is quite rare, and is so intermixed with the common dwarf balsam that you have to examine each tree before you are sure to which species it belongs. One locality where it can be seen is near the southern limit of the Alpine Garden. Here also is found the dwarf spruce, though it is not so common as the fir. The discovery of *Pinguicula vulgaris*, by Professor Hitchcock, in Butterworth Flume, on the north side of Mt. Willard, is well known.

While so many of the plants are confined to limited areas, there are others, as the *Rhododendron*, the *Arenaria*, *Nabalus Boottii* and *N. nanus*, *Carex rigida* and *Poa laxa*, which are found almost everywhere on the east side of Mt. Washington. *Poa laxa* grows in thick tufts along the old bridle paths, especially near the summit of Mt. Washington. *Carex rigida* produces the green herbage of the summit of Mt. Washington, and over large areas it is the only green thing.

Carex capitata is the most attractive as well as the most limited of the Carices.

Diapensia Lapponica grows immediately on the summit and extends a little down the eastern slope, and so exposed are the localities where it grows that, when in blossom, there are considerable areas where it is difficult to find a flower that has its petals all entire. With the exception of *Carex rigida* it is the most hardy of all the flowering plants of the mountains. It grows in Lapland, and from thence specimens were obtained that gave it a name; and it is described as "the hardest plant of that bleak region." *Salix Cutleri* is the most widely distributed of the willows; it is especially common in the Alpine Garden. The alpine azalea (*Loiseleuria procumbens*), the most beautiful and brilliant of all our alpine plants, though above 1582 metres, extends over large areas, and wherever found is very abundant. On Mt. Clay, just over on its eastern slope, it is found on the borders of the great ridges, and sometimes it extends almost continuously for several feet. Its bright evergreen leaves in tufted masses thickly set with rose-colored flowers approaching purple, make it the most attractive of all our flowering plants. In the United States it is confined to this area, but it is interesting to know that it is found on the mountains of Norway, on the Scottish Hills at the height of 1080 metres, and in more southern latitudes on the Venetian Alps at the height of 2133 metres. It is found in Newfoundland, in Labrador, and on the barren grounds from Lat. 65° to the Arctic seas. The most delicate of all our plants, *Cassiope hypnoides*, though not so abundant as the *Loiseleuria*, has almost the same range. Its delicate white corolla tinged with rose-color would lead one to suppose that in our latitude it could only survive in a green-house, where it could receive the most tender care, but here we find it within 30 metres of the top of Mt. Washington.

Of the mountain plants, the heath-like evergreen shrub, *Phyllodoce taxifolia*, the yew-leaved heath, Professor Tuckerman thinks the most attractive. With its nodding purple flowers, it is indeed to be admired, but it lacks the delicacy of *Cassiope* and the brilliancy of *Loiseleuria*. It is somewhat more extended in range than these, being found in a depression that slopes toward the Lake of the Clouds.

To follow each of the species thus in detail would require too much time, so I will notice only *Paronychia argyrocarpa*. It is confined chiefly to the White Mountain Notch, in the vicinity of the Willey slide. Professor Tuckerman, however, found it on Mt. Crawford, and I have seen it on Chocorua.

The time that these alpine and sub-alpine plants are in blossom varies somewhat with the different seasons and the localities in which they grow. And strange as it may seem, the *Rhododendron*, which has the most showy flowers of any of the plants that grow on the higher ridges and summits, opens first of all. Last summer, by the 26th of June, it was in full blossom, and by the 1st of July it was difficult, except here and there, to obtain good specimens, so quickly do they disappear.

We here add a list of the plants collected, with the time they are in flower. The first part (I.) includes those that are in blossom the last day of June, the second (II.) those on the fourth of July, the third (III.) those on the tenth of July, and the fourth (IV.) those on the first of August.

I.

<i>Cardamine bellidifolia</i> , L.	<i>Salix chlorophylla</i> , Anders.
<i>Stellaria uliginosa</i> , Murr.	<i>Salix Cutleri</i> , Tuck.
<i>Silene acaulis</i> , L.	<i>Salix argyrocarpa</i> , Anders.
<i>Amelanchier Canadensis</i> , var. <i>oligocarpa</i> , T. & G.	<i>Salix herbacea</i> , L.
<i>Ribes lacustre</i> , Poir.	<i>Listera cordata</i> , R. Brown.
<i>Viburnum pauciflorum</i> , Pylaie.	<i>Luzula parviflora</i> , Desv., var. <i>melanocarpa</i> .
<i>Vaccinium uliginosum</i> , L.	<i>Luzula arcuata</i> , Meyer.
<i>Vaccinium cæspitosum</i> , Michx.	<i>Luzula spicata</i> , Desv.
<i>Cassiope hypnoides</i> , Don.	<i>Juncus trifidus</i> , L.
<i>Phyllodoce taxifolia</i> , Salisb.	<i>Eriophorum vaginatum</i> , L.
<i>Kalmia glauca</i> , Ait.	<i>Scirpus cæspitosus</i> , L.
<i>Rhododendron Lapponicum</i> , Wahl.	<i>Carex scirpoidea</i> , Michx.
<i>Loiseleuria procumbens</i> , Desv.	<i>Carex capitata</i> , L.
<i>Pyrola minor</i> , L.	<i>Carex canescens</i> , var. <i>vitilis</i> , Fries.
<i>Diapensia Lapponica</i> , L.	<i>Carex rigida</i> , var. <i>Bigelovii</i> , Torr.
<i>Oxyria digyna</i> , Campd.	<i>Carex irrigua</i> , Smith.
<i>Empetrum nigrum</i> , L.	<i>Carex atrata</i> , L.
<i>Betula glandulosa</i> , Michx.	<i>Poa cæsia</i> , Smith.
<i>Alnus viridis</i> , D. C.	

II.

<i>Viola palustris</i> , L.	<i>Vaccinium Vitis-Idæa</i> , L.
<i>Paronychia argyrocarpa</i> , Wahl.	<i>Ledum latifolium</i> , Ait.
<i>Geum radiatum</i> , var. <i>Peckii</i> , Pursh.	<i>Castilleja pallida</i> , Kunth.
<i>Potentilla tridentata</i> , Ait.	<i>Hierochloa borealis</i> , R. & S.
<i>Rubus chamæmorus</i> , L.	<i>Hierochloa alpina</i> , R. & S.

III.

<i>Arenaria Grœnlandica</i> , Spreng.	<i>Habenaria obtusata</i> , R.
<i>Epilobium alpinum</i> , L.	<i>Habenaria dilatata</i> , Gray.
<i>Arnica mollis</i> , Hook.	<i>Phleum alpinum</i> , L.
<i>Nabalus nanus</i> , D. C.	<i>Agrostis canina</i> , L.
<i>Veronica alpina</i> , L.	<i>Poa laxa</i> , Hænke.
<i>Polygonum viviparum</i> , L.	

IV.

<i>Solidago Virga-aurea</i> , var. <i>alpina</i> , Bigel.	<i>Euphrasia officinalis</i> , L.
<i>Solidago</i> , " var. <i>humilis</i> , Pursh.	<i>Rhinanthus Crista-galli</i> , L.
<i>Solidago thyrsoides</i> , Meyer.	<i>Cinna arundinacea</i> , L.
<i>Nabalus Boottii</i> , D. C.	<i>Calamagrostis Langsdorffii</i> , Trin.
	<i>Aira atropurpurea</i> , Wahl.

The two cryptogams collected, *Lycopodium Selago* and *Phegopteris hexagonoptera*, were in fruit the fifth of July. *Arctostaphylos alpina* has not been seen in flower or fruit.

An interesting feature of the flora here is the intermingling of the low-land with the alpine plants. The plant that is the most widely distributed and climbs the highest is *Veratrum viride*. It is found 1768 metres above the sea, or nearly 150 below the summit of Mt. Washington, while southward in Connecticut it is found almost at sea level. *Aspidium spinulosum*, var. *intermedium*, is found at the altitude of 1695 metres. Professor Gray gives this a very wide range. *Coptis trifolia* and *Trientalis Americana* were seen at an elevation of 1653 metres; *Cornus Canadensis*, and *Clintonia borealis* at 1620 metres; and the great coarse *Heracleum lanatum* about the head of Tuckerman's Ravine.

These plants, both alpine and low-land, when found in the territories and Pacific States, grow at a much higher altitude than we find them here.

The low-land plants on Mt. Washington grow only in depressions on the east side of mountains where snow accumu-

lates to a great depth, and remains comparatively late, generally until the middle of June. The alpine and sub-alpine plants, with few exceptions, also flourish best where snow accumulates.

Secretary's Report for 1876.

Although the Constitution does not call for an annual report from the Secretary, yet as there are now, and doubtless will be in future years, some matters which may appropriately form the subject of such a report, and which seem likely to be brought to the attention of the members of the Club in no other way, I have thought it well to inaugurate the custom of making it.

I have to notice first the great and timely assistance rendered to the Club by the Massachusetts Institute of Technology, in allowing us the free use of a room in which to hold our meetings. We have thus been relieved of a considerable expense for room rent, which would otherwise have been necessary, and would probably have prevented our making any publications for several years, thus very much delaying the growth and restricting the usefulness of the Club.

The Boston Society of Natural History, too, kindly came to our assistance, offering to the Club the use of one alcove in its library for the storage of books and maps belonging to the Club. The Club has as yet made no use of this space; but it is to be hoped that as our membership increases, and we become more widely known, we shall be able, by gifts and loans, and by purchases, to collect a library of books and maps of interest to our members.

As a beginning, I am able to announce the receipt of the following maps and pamphlets:—

1. Journal of a Tour to the White Mountains in July, 1784; by Jeremy Belknap, D.D. 1876. 8vo.
2. An extra copy of the map accompanying the above.
3. White Mountain and Winnipiseogee Lake Guide Book. Boston: Jordan & Wiley, 1846. 16mo.
4. The Greenstones of New Hampshire, and their Organic Remains; by George W. Hawes. 1876. 8vo.

5. *Ascensione al Monte Bianco*, di Luigi Dell' Oro di Giosnè. 1875. 4to.

6. *La Revue Géographique*, for April 10, 1876; containing an article on Central Africa, illustrated by a map of the region.

7. *Official Catalogue of the Natural and Industrial Products of New South Wales*, forwarded to the International Exhibition of 1876, at Philadelphia. 1876. 8vo.

8. *Mines and Mineral Statistics of New South Wales*. 1875. 8vo.

9. *Mineral Map and General Statistics of New South Wales*. 1876. folded 8vo.

10. *New South Wales; its Progress and Resources*. 1876. 16mo.

In compliance with a vote of the Council, I sent out, in the early part of last summer, about 350 of the Club's circulars to the proprietors of hotels and boarding-houses among the mountains of New Hampshire, Vermont, Massachusetts, New York, and Pennsylvania, requesting them to post the circulars in their houses; and also to fill out and return to me a blank, sent with the circulars, giving the situation of the house, the points of interest in the vicinity, and the prices of board. About seventy-five of those to whom these circulars were sent complied with my request, and I thus have it in my power to give information concerning the accommodations to be found at a very large number of mountain resorts. The experiment will probably be repeated next summer, and, doubtless, as we shall be better known then than we were last summer, a much larger number of hotels will respond than before. It is hoped in this way to get information which will be of value to persons proposing to visit new regions, and wishing to learn the accommodations to be found and the prices they must pay for them. Any information of this kind in my possession will be cheerfully given to any one who may apply for it.

Finally I have to mention that a scrap-book has been procured for the reception of newspaper articles of interest to the Club. It now contains a number of notices of our meetings, notices of Appalachia, and scraps concerning the moun-

tains; and I would respectfully request members who may happen to find similar scraps in the future, which they do not care to keep themselves, to forward them to me for the Club Scrap Book.

Respectfully submitted,

J. B. HENCK, JR., *Secretary.*

Boston, Jan. 10, 1877.

Treasurer's Report for 1876.

The receipts for the year were as follows:—

Assessments for 1876 from 34 original members . . .	\$68.00
Admission fees from 92 members elected in 1876 . . .	184.00
Received for Appalachia, No. I. and for maps, by the Secretary and Treasurer	24.65
Received for copies sold by A. Williams & Co.	18.68
Total Receipts	<u>\$295.13</u>

The expenses were as follows:—

For 500 copies of Appalachia, No. I.	\$106.36
" maps accompanying the same	34.50
" Appropriation for Department of Improvements	15.00
" Printing, postage, stationery, etc.	109.61
	<u>\$265.77</u>
Balance in the Treasury	\$29.36
	<u>\$295.13</u>

H. F. WALLING, *Treasurer.*

Boston, Jan. 10, 1877.

Reports of the Councillors for the Autumn of 1876. Improvements.

BY WILLIAM G. NOWELL.

Read Dec. 13, 1876.

The Councillor in this Department judged his duty during the Club's first summer to be twofold, viz., to do as much as possible of the work mapped out for the Club in the field of improvements, or to get it done; second, to have that work tested and approved by use. Had he left testing the work and

proving its benefits wholly to the chance inclinations of summer tourists, — and in so doing neglected his duties as one of the three nuclei selected for convenience in forming expeditionary parties, — and yet more, had he not been led astray from his own province by the tempting fruits ripening on the grounds of his neighbors, the Councillors of the other Departments, the improvements accomplished might have been greater in amount and better in quality.

As it is, this report of what has been done in the way of laying out, cutting, measuring, marking, and signalling paths, clearing points of view, depositing record-bottles, and building camps, must be brief in extent, though double in character. It comprises accounts, first, of the work done; second, of the work as tested. The latter portion, having reference mainly to but one locality, will be printed in the next number of *Appalachia* as an article upon the Mt. Adams Paths, and will be illustrated with a map and a profile of grades. The first part is presented now, as follows.

THE WORK DONE.

I. Paths and Clearings.

1. — *On Boy Mt.* This hill, the highest and westernmost on the west spur of the Randolph range, rises 185 metres above the driveway at the door of the Mt. Adams House and over 680 metres above sea-level. Its position near the end of a spur projected into the valley of the Israel and its accessibility, render it desirable as a point of view. During the summer the path to its summit through the woods back of the hotel named has been improved, and on the top of the mountain extensive openings, covering over 1,000 square metres, have been cut in the interest of the topographical and art departments. Mr. Edmands and Dr. W. B. Parker have been assisted in this work by several volunteers, some of them not members of the Club, nor all of the axe-wielding sex.

By means of this clearing, the view, especially fine in the light of the late afternoon, has been greatly extended, so that it now sweeps from Madison (east-south-east) by the south and west to Prospect Hill (north-west), with openings north-

east and north-north-west (the latter showing Starr King); and by an easy climb into the top of a large fir, bushed out for the topographers, the whole horizon is brought within sight. When the setting sun is flooding the green valley below with misty gold, bathing the shoulders and penetrating the uttermost recesses of the ravines of the Great Range with warm hues of rose and purple, and transmuting the stony gray peaks aloft into amethyst, those who linger on this little mountain till near the coming of the night-shadows, will not fail to perceive why the Club should prize what has been done here in its name during the past season.

August 28, the day after our week on the Great Range and Carter Dome, Dr. Stafford of Montreal and your Councillor measured the length of the Boy Mt. Path with a decametre line, noted its compass courses, and by three series of observations with an aneroid and thermometer ascertained approximately its grades and the elevation of the top of the mountain. The results of these measurements and observations have been collected in a table, and a copy of the same filed in the archives of the Club, together with a map and a profile of grades based upon this compilation.

2. — *On Carter Dome.* As a result of the exploration of August 26–27 (see p. 76), paths to this mountain and points of interest in its vicinity have been marked out by the following routes:—

1. From the first road-gate on the Carter Notch road from Jackson, north-northeast, across Little Wildcat River and Narrow Brook, and through what is known as “The Clearing” to the Wildcat proper, 1800 metres; thence north-northwest to the Ponds in the Notch, 2900 metres, following nearly the course of the present fishermen’s trail, but avoiding three of its river crossings and keeping mainly on the east bank of the Wildcat. From the Ponds the path, as planned, ascends the northwest face of the southwest spur of Carter Dome, gradually curving from a northeast to a southeast course, and then coming out on the bold brow of Diamond Crag. From this point it passes on a gentle grade northeast to the crown of the Dome, 2800 metres from the Ponds.

2. A path has been located, but not yet constructed, which will leave the Peabody Valley about 1,400 metres east of the Glen House, following the true left (west) bank of Nineteen-Mile Brook about 2,500 metres to the foot of the Slide of 1869, then deflecting to the right and intersecting at the Ponds the path first described. This section of the path will not exceed 2000 metres in length, and the whole distance from the Peabody to the Dome will be under 7300 metres ($4\frac{1}{2}$ miles). The Nineteen-Mile Brook section may be reached from the Glen House by way of the aqueduct path.

3. A way of descent from the Dome by the ridge running down on the east side of the Slide to the bend of the upward path at its foot has been marked for construction, but will not be recommended as an easy way of ascent.

4. Another southern route, from "The Clearing" northeast, along the southeast spur of the Carter Dome Group and around the ravine opening into G. 6. 2, to the east slope of G. 6. 1, has been prospected, but its greater length will probably cause its construction to be deferred until more desirable paths are completed.

Generous pecuniary assistance in the construction of these paths to Carter Notch and Carter Dome has been promised by the Messrs. Milliken of the Glen House, Mr. Wentworth of the Thorn Mt. House, and other landlords in Jackson, and experienced woodsmen have agreed to undertake the work according to the plans proposed. Your Councillor will go into camp in that neighborhood a week or two next summer, unless some other member of the Club will take these enterprises off his hands.

A clearing was begun on Carter Dome August 27, but the work was interrupted by a rain-storm. An observatory is to be built of the low trees cut down, and the size of the clearing necessary for a complete view thus lessened.

Since this report was read, your Councillor has received news from Mr. Jonathan G. Davis, who lives near the first road-gate on the Carter Notch Road, and who accompanied our Carter exploration party, that he has constructed, according to agreement, the path described in the paragraph of this

report labelled 1 (p. 111). The Wildcat is crossed by this improved route only three times, and the path is being completed after the excellent pattern set on Mt. Adams.]

3. On Mt. Adams. — Upon this mountain work has been vigorously carried forward, mainly in accordance with the suggestions of last spring's report in the Department of Improvements. Two sections of path have been labored upon.

1. Six hundred metres into the woods south 15° east from Brookvale, stands a tiny fir-bark shelter called Grace's Camp. This was the headquarters of the little three-year-old and stronger workers who spent the 7th of Sept., 1875, in constructing 1200 metres of Lowe's Path up the main northern ridge of Mt. Adams. Your Councillor had been over the ground three times within the previous month, and had found in Mr. Charles E. Lowe a ready sympathizer in his wish for an easier way to ascend this noble mountain, than by struggling through thick unbroken forest and over huge moss-grown boulders. During that autumn Mr. Lowe cut out 1000 metres more of the path by the route we had chosen. Your Councillor kept in frequent communication with him during the winter and spring, and, before July vacation came, received word that the next and most difficult part of the path had been constructed and the open ledge reached at 3900 metres from the travelled road. On our first day of ascent, in July, we found the work proposed in a state of forwardness which gave good promise of the high degree of excellence attained before the season closed.

During twenty-three days spent on Mt. Adams, partly with other objects in view, we succeeded in accomplishing in a manner not discreditable to the Club most of the work remaining to be done. We cleared the path, widened it in some places, measured and marked it; set signals upon the open ledge; and built camps. Underbrush, branches, trip-roots, stumps, and stones were removed, and holes filled; with a decametre line we tallied 705 times between the Moose and the summit of F. 3. 1, 100 of the 705 being on a course over the ledges which we afterward abandoned. We blazed over 400 trees along the 3900 metres of wood-path, cutting

two blazes on each tree, that on the summit-ward side higher than the other; and we have struck a third of these blazes with the **A** stamp of the Club hatchet. A durable tree has been marked at each hectometre (tenth of a kilometre), and 39 boards, 1 decimetre by 2, have been prepared, on which are designated, in black paint on white, the number of kilometres and tenths from the foot of the path; thus, 0^k.1, 0^k.2, 2^k.8, 2^k.9. These characters may be read, e. g., as 2 kilometres and 8 tenths, 2 kilometres and 8 hectometres, 2800 metres, or, briefly, "two k. eight." The boards are to be fastened to the hectometre trees with suitable nails and washers. Similar hectometre marks have been painted in white upon twenty-two flat stones set up edgewise between the last tree (at 3^k.9) and 6^k.05 at the summit. Between these limits about thirty signals have also been set, with three stones for a base, and a fourth of milky quartz, or painted white when no stone of the desired color was at hand, upon them.

Where the ascent through the last 1200 metres of the woods was steep, the path has been left only a metre wide, so that the hands might find trees within easy reach and assist in the climb or rapid descent. Elsewhere free passage of two to three metres width is afforded, and through most of the lower 2700 metres a cart might be driven.

The grades of the path have been ascertained approximately by numerous barometer observations along its entire length, and in the first 800 metres by means of a pocket-level and staff. As soon as the levelling is completed to the summit, indications of elevation will be added to those of distance on the boards at the hectometre trees and on the flat rocks above the forest. It is our intention to connect this portion of our survey with the railroad station at Gorham by transit.

The projectors and constructors of this path guarantee that next year its present imperfections shall be removed. Arrangements will be made for the collection of water in the shallow wooded lateral ravine just below the 4k. rock, and also near the summit of F. 3. 1; and conveniences for camping will be provided in the ravine just named and at the sources of Snyder Brook. Explorations will be continued for the location of a bridle-path. The present path will be

rendered much smoother, and will be extended from 4^k.4 to Mt. Jefferson and the Castellated Ridge, viâ Spaulding's Spring and the Sphynx; with a return to F. 3. 1 by way of Peabody Spring; and from 4^k.7 to Madison, viâ the Head Wall of King's Ravine and Snyder Brook; with a return to F. 3. 1 by way of Star Lake and John Quincy Adams. Other routes can, and of course will, be taken, in fair weather by skilled pedestrians; but it is our purpose to signal the easiest lines of travel on the Presidential Range and make walks there practically safe in fog and cloud.

2. One glorious morning in August Mr. Lowe and your Councillor sat down in King's Gateway and talked of a path through King's Ravine, as we had talked in less inspiring places, but were too busy, and nothing came of it until September 16th, the day of Mr. Edmands's exploration, an account of which is given elsewhere in this number. As the outcome of this exploration and in connection with it a grand beginning has been made in the work of constructing a passable way through this tremendous hollow in Mt. Adams, the most impressive ravine of the great range.

The route chosen takes one from a point not far beyond 2^k.2 on the main path up Mt. Adams, through the heavy timber of the lower part of the Ravine 1000 metres, to a pretty cascade on Cold Stream, just the place for a pleasure-party camp. Thence it runs along the east side of the Ravine through more but lower timber to the great barrier of boulders, with their caves, five to ten metres deep, sheltering ice the year round; it passes between or under these gigantic rocks, as their collocation permits, to a 400 metre strip of black growth, mostly fir; beyond that, through 800 metres of birch brush to the rocky bed that slopes away from the steep smooth ledge of the Head Wall, and then up and out through the grand Gateway itself.

Visitors to Mt. Adams will find it best to ascend by the main path and descend by the route just described, if they wish to include the Ravine in their excursion. This newest branch of our net-work of paths upon the northern slopes of this massive mountain will be put early next summer into as good condition as the nature of the ground will allow.

II. Camps.

The only camps which your Councillor has to report as constructed are: —

1. The wee-bit called Grace's Camp, 1^m.5 square and as high at front, located at 0^k.6 on Lowe's Path, and convenient to shelter the youthful members of picnic parties near the brook that flows close by.

2. The commodious camp at 3^k.05 on the same path, which, with small expenditure of money but considerable outlay of muscle and the indispensable assistance of Charles Lowe, was built July 15 in part, and finished July 21, 1876. Your Councillor gave it the name of A. M. C. Camp, and had the pleasure of welcoming under its capacious bark during the two months succeeding its erection one hundred and forty-two visits from fifty-four different persons. Of these visits seventy-six have been camps-over-night made by thirty-seven different persons.

This camp measures over 2m. in height at front, nearly 2m. in depth, is 4m. long, and about 1^m.5 high at rear. Yet its guests have been so numerous on several occasions that your Councillor's shelter-tent was called into service to eke out our accommodations. An additional camp, also of fir-bark, will be built at this point (1030 metres above sea-level and half way to the top of F. 3. 1), the highest at which running water has been found on the path.

III. Bottles Placed.

Bottles have been deposited this season at A. M. C. Camp, July 15; on Mt. Adams (two), July 21 and Aug. 9; on Mt. Madison, Aug. 10; at Spaulding's Spring (head of the Ravine of the Castles), Aug. 23; all by W. G. Nowell and parties numbering from four to eleven persons; on Mt. Liberty, Aug. 9, by E. C. Pickering and B. P. Moore; on Moat Mt., Aug. 16, by J. Worcester and party; on Mt. Tremont, Sept. 4, by J. B. Henck, Jr., and party. Records were also left, in a tin can, on Mt. Willey, Aug. 28; and, in a non-official bottle, on Carter Dome, Aug. 27.

A record-book has been purchased by this department into which will be copied all entries made in record-bottles, or otherwise left on mountain summits or at points difficult of access, so far as such entries shall be received, and found to be of general interest.

The Council's appropriation of \$15 to this department has also met the cost of the record-bottles, stamp-hatchet, and materials needed for our work; while the gift of \$30 by Mrs. Jared Sparks has enabled us to carry forward rapidly the labor of signalling paths upon the great range and to provide for their extension.

The work begun in this department during the past season was shared in by several mountain-lovers not then Appalachians, and your Councillor, in closing this report, expresses the wish and hope that this work may be taken up next summer with a renewed enthusiasm which shall secure the energetic co-operation of a large number of members of the Club, and the interest of many others whose names are not yet enrolled with ours, but whose spirit is akin with that which inspires our organization.

Reports of the Councillors for the Autumn of 1876. Exploration.

By J. R. EDMANDS.

Read Dec. 12, 1876.

In reporting upon this department, your Councillor begs leave to invert the natural order, and to first consider an important field, which seems to fall within its province; namely, the recording of miscellaneous observations and the preservation of the record in a form accessible to specialists in various branches. I do not here refer to systematic observations made with a single object in view, but to such scattered notes as most of the members will be likely to collect. This indeed is in accord with the idea of utilizing the cumulative value of results inconsiderable by themselves, — an idea to which the Club may be said to owe its existence.

In reporting work of this nature to the department members should conform to the following system: —

1. Give the original facts as well as the results deduced from them.
2. So describe the instruments or methods of observation that another may judge of the weight attaching to the results.
3. Use the tabular form as far as may be, but add "remarks" liberally.

During the past summer much information probably was obtained, which has not found its way directly to either of the other departments, but which may be collected and made available in this way. It is impossible to specify what is desirable and appropriate on account of the wide range covered; but anything worth noting is probably also worthy of preservation here.

More intimately connected with the subject of Exploration is the project to collect desirable information in regard to each mountain, — best methods of ascending and descending, difficulty of the trip, best points of view, places where potable water may be found, facts which it is especially desirable to determine, etc.

The department may before another year issue blanks to be filled out, but their form can be effectively arranged only after some experience in tabulating material already collected. So members will confer a favor by arranging their material to their own taste, and by sending what they have as early as convenient.

A review of the summer's work shows no exploration made under the auspices of the department, but presents a gratifying list of excursions by individual members and their associates.

The opening expedition of the season was that of the President and Vice-President on Black Mountain (Sandwich Dome) referred to at the June meeting. Mr. Nowell's exploration of Carter Dome and my own through King's Ravine were reported at the October meeting and are described elsewhere in this number. I also visited the western summit of the Randolph Mts. in company with Mr. C. E. Lowe.

Leaving the road about a kilometre east of Mr. L.'s house we climbed first to the bare ledge so prominent in that neighborhood and then followed the ridge to the summit. The *ledge*

promises to be an important topographical station and offers a fine view. At one's feet lie the farms of Randolph and Randolph Hill; beyond are Mt. Moriah, the Imp and the mountains north-east of the Androscoggin; while the southern view is occupied by the near forms of Madison and Adams, with the whole length of King's Ravine directly in front. The cutting, however, necessary to open the view from the *summit* of the mountain looked more formidable than we had hoped.

Appended to this report will be found short descriptions or notes of excursions by several members of the Club.

BLACK MOUNTAIN [SANDWICH DOME]: TWO EXCURSIONS. BY PROF. C. E. FAY.

The former was made on the 21st and 22d of July last, and consisted first of the ascent of that mountain through the forest on the Sandwich side. Having first observed the character of the growth and "lay of the land," I set out by way of Bennett St., for the apparently highest point as seen from the McCrillis farm. Followed for a little distance the trail to Flat Mt. Pond, but soon struck into the forest and upward. Found but one or two points granting outlooks in the whole ascent, which was, for the greater part, not difficult, being through trees of goodly size, with a few patches of close-set small spruces nearer the top. Was somewhat bewildered on reaching the apparent summit not to find a familiar region. What had seemed from below the highest peak, where I had now arrived, is in reality the lower and northeasterly of the two points of nearly equal height in which this *irregular mass* culminates. This one is covered with quite high growth. The other, on which stands the U. S. C. S. signal is quite bare immediately at the summit. (From McCrillis's it is foreshortened and lies about midway of the "sag" between the apparently highest and next lower peak to the left.) The intervening space is rather difficult to traverse for fallen trees and thick underbrush. Had left the Bennett road at noon and reached the signal at 2:55 P. M. Remaining on the summit until 3:30, descended by the path on the west side, and reached Doloff's on the Waterville road at about 6 o'clock. Spent the night at Campton Village. The following day returned to the McCrillis farm *via* the Sandwich road and the wilderness that lies between Black Mt. and Mt. Israel. The distance from the point at which the Notch road was left, by Sandwich village, to McCrillis's is sixteen miles. By this cut-off more than half the distance was saved, though not so much in time. Striking off from the road at 10:30 A. M. at the old Durgin farm, just over the line between Campton and Sandwich, found a good cart-path through the first belt of woods and over a large upland pasture. At a little distance beyond lost it. For some miles one follows a course a little north of east through a dense forest,

though of quite easy passage. Passed Guinea Pond on the north border and came out upon a large stream at the southwesterly base of Young's Mt. at 1 o'clock. Crossed over the easterly spur of Young, and reached the McCrillis farm at 3 o'clock. In the vicinity of Guinea Pond followed quite recent bear-tracks for a long distance. Am told that, if I had passed to the south of Guinea Pond, I should have found a good trail out to the Guinea Hill road. In this case the amount of travel without a path would hardly exceed a mile.

The other excursion, made with Mr. Anthony (A. M. C.) of Providence, consisted in the ascent of the same mountain by the path, and a descent along the crest of the rugged southwesterly spur, and over the lower conical peak (nameless?) that buttresses it on the west and from Campton coalesces with it; clearly visible only when cloud fills the intervening valley. This method of descent offers nearly every variety of style and difficulty: long reaches of windfalls among tangled growth, where progress is reduced to a minimum; reaches of rapid transit over the bare crest; and withal some extremely difficult clambering down through the small growth (deciduous and evergreen) that finds a scanty foothold on the rocky southerly side of this ponderous spur. The views are fine save to the north and northeast. We spent some time upon the great white boulder stranded on the crest, that is so plainly visible from Campton. Were nine minutes (climbing against time) in ascending through the brush from the col to the summit of the small peak before mentioned. On descending from this we kept too far to the left, and came out at the old Durgin farm on the Sandwich road. The day was so warm as to be hardly comfortable even on the summit, and we found no water from the time we left the head of the ravine at noon until we reached the road at seven o'clock.

MT. WILLEY (AUG. 28, 1876). BY J. B. HENCK, JR.

On the fiftieth anniversary of the famous Willey slide, a party of ten persons, including two ladies, ascended Mt. Willey. Starting from Intervale Station, North Conway, at 7:20 A. M., the train was stopped at the first bridge south of Moore's Brook flag-station, on the slope of Mt. Willey. Leaving the train the party followed up the brook, which here crosses the railroad, to its source; then striking through the woods nearly in a straight line for the top. The first third of the ascent from the railroad, that is perhaps half the length of the brook, is over ledges; where when there is sufficient water many pretty cascades are to be seen. The second third is easy climbing, the bed of the brook being much wider than the stream and most of the way furnishing very good walking. The last third is almost entirely through the woods and is pretty steep and sometimes rather rough. The time of ascent from the railroad was about two hours and three-quarters.

Mt. Willey, being in the very midst of the mountain region, commands

fine views of the mountains and valleys in all directions. There is perhaps no better point from which to study the East Branch of the Pemigewasset than here, for it is in full view from its source in Ethan's Pond to its confluence with the Pemigewasset near North Woodstock, — the broad valley one unbroken stretch of forest.¹

Leaving the summit about three o'clock, the descent was accomplished in about two hours, following the same path by which the ascent was made, excepting that the lower third of the descent was made by an ill-defined path through the woods on the north side of the brook instead of over the ledges, — a quicker, easier, and safer way, especially to descend by. A good path ought to be made through this portion of the woods and from the head of the brook to the summit. The ascent would then be quite easy and would doubtless become very popular with such as like real mountain climbing with the prospect of fine views as a reward.

Walking perhaps an eighth of a mile to Moore's Brook the party signalled the six o'clock train from Fabyan's and arrived safely in North Conway.

Mts. WEBSTER AND JACKSON (AUG. 29, 1876). Mts. CRAWFORD, RESOLUTION, AND THE GIANT'S STAIRS (AUG. 30, 1876). BY W. H. PICKERING.

At a little after 7 A. M., I left the Willey House with a friend, reached the Silver Cascade in forty minutes, and then followed up the bed of the brook nearly to the summit. The bed is quite steep and slippery, and in some places rather dangerous. The measured inclination of quite a long slope proved to be 40°; and in some places there were overhanging ledges. One should follow the right branch of the brook, which leads up behind the northern shoulder of Mt. Webster and ends within three hundred yards of the summit. The rest of the way is easy through evergreens, with only a very little scrub just below the top. We reached the summit at 11:20, without hurry and with two stops of fifteen minutes each. The distance from the Willey House is about 7 km. or 4½ miles. The summit is formed by a long irregular ridge descending toward the south. It is composed of bare rock which contains considerable iron, and is slowly rusting away. The slope on the side of the Notch is remarkably steep, and affords a fine opportunity for rolling boulders. We stayed on the summit two hours and then crossed over to Mt. Jackson. The walking was quite easy and level, through tall evergreens, neither summit being visible any of the way. The summit of Jackson consists of a little cone of nearly bare rock, about 100 metres (or yards) in diameter at the base, and nearly 25 metres or 80 feet in height. Only a few low bushes and some scanty grass grow upon it, and it has altogether a most lonely appearance. We stayed on the summit thirty-five minutes, and then struck down for the Crawford Path, which we followed to the Crawford House, arriving there

¹ For details of view see Osgood's Guide Book, p. 154.

at 5:40 P. M. The whole walk, however, might readily have been accomplished in eight hours. We then kept on through the Notch, to the Mt. Crawford House, where we were to pass the night, preparatory to ascending Mts. Crawford, Resolution, and the Giant's Stairs the next day.

We started at eight o'clock the next morning, and were shown the entrance of the Mt. Crawford Path by the hotel keeper. Followed this some distance, till at length it apparently forked. Followed the most marked division, a deep gully, which in the course of half an hour proved to be the wrong one; so had to strike up through the trees and bushes, till at length we came to the bare rock, which is rapidly crumbling into gravel. The rest of the way is very easy. The knoll is not apparent from this direction, and indeed we were not sure we had reached it till we stood on the very brink of the precipice. It does not show for much from the summit, and we were greatly disappointed in it. The average slope for the whole distance (about 45 metres) is 57° , and the steepest slope (for one third that distance) is 78° . The view from Mt. Crawford, however, is very fine; and unlike any other in the mountains. The time necessary for the ascent is about two hours. We left Mt. Crawford at 11 A. M., arriving at Resolution in an hour and a half. The old Davis path can be followed part of the way, but it is easier to force one's way through the bushes, than to spend time in tracing it. The view from the summit is not remarkable. In ascending the Giant's Stairs one should keep well to the left. The lower stair is about 60 metres, or 200 feet, in height, and composed of loose, crumbling, stratified rocks, which are very liable to give way, and cause a serious fall. The average inclination is 46° , and 75° for a distance of 25 metres. The upper stair is about 40 metres or 130 feet high, composed of hard, smooth rock which affords very slight footing. Indeed we had to pull ourselves up by our hands part of the way, which was as steep as the lower stair, and more difficult if less dangerous. We descended by a slide farther to the west than where we climbed up. This I think would be the easiest way of making the ascent, although the slope for a long distance is at least 40° . The slide leads into a large brook, which flows into the Saco very near the Mt. Washington River. I reached the Mt. Crawford House at 5:45 P. M., having taken nine hours and three-quarters up to that time, although seven hours and a half is all that would be necessary. Then walked on to North Conway, where I arrived at 11 o'clock.

MT. LIBERTY (AUG. 9, 1876). BY PROF. E. C. PICKERING.

Among the most attractive objects to the visitor of the valley of the Pemigewasset are the sharp peaks of Mts. Liberty and Flume, sometimes known as the Franconia Haystacks. Doubtless many pedestrians, like myself, must have wished to make their ascent; and from the Flume House they appear so near that it looks like a matter of no great difficulty. The sides are, however, wholly wooded, and those familiar with the scrub growth of Mt. Lafayette and the Twin Range will know that a little of such an obstruc-

tion would render the ascent by no means easy. On the morning of Aug. 9th, Mr. B. P. Moore of Baltimore, and the writer left the Flume House at 8:00 A. M., prepared for the attempt to ascend Mt. Liberty. Passing through the Flume and climbing over the rocks at the top, we reached a point about 90 metres (300 feet) above the bridge and 30 metres (100 feet) above the Flume House at 8:23. We followed the Flume Brook up until 9:13, to a point having an altitude of about 630 metres (2050 feet), or 140 metres (450 feet) above the Flume House. Here we met the ridge coming down from Mt. Liberty and dividing the Flume Brook from the stream draining the valley to the west of Mt. Liberty. From this point the ascent was through the thick pine woods, and the slope was constantly though slowly increasing. At 10:57, after 460 metres (1500 feet) vertically of this travelling, at a height of about 1200 metres (or nearly 4000 feet), the character of the vegetation changed. The trees grew small and near together, and soon after at 11:10 we entered the scrub. The walking grew worse and worse, but we found that we had struck exactly the point we aimed at, the southern end of the ridge forming the top of the summit, or the top of the forehead of the face which this summit appears to resemble as seen from the other side of the valley. The last hundred yards is slow and laborious work, and probably took us nearly half an hour. The mountain terminates in a sharp saw-like ridge, and one stands perched on one tooth of the "saw," held up by the surrounding scrub and looking down the steep slope of about 600 metres (nearly 2000 feet) on each side. It is easy to stand still but hard to move, since to the obstruction of the trees is added the difficulty of climbing over the rough rocks. Moreover, as this was the first time I had carried the micrometer-level over such rough climbing, I found its fifteen pounds far from an assistance. On finally reaching the top, a superb view greeted us. While resembling that from Lafayette, it is yet too unlike to seem a repetition, while in many respects it surpasses its more pretentious rival.

To the north Mt. Lincoln nearly covers Lafayette, the latter appearing as a narrow line to the right of the former. To the north-east the Twin Range appears to great advantage, with the Presidential summits to the right of the South Twin. Nearly in line with Whiteface we look down on Mt. Flume, which from this point appears entirely wooded on top and a little lower than Liberty. But the demands of the micrometer-level cut short the enjoyment of the view, and after three hours devoted to measuring 323 angles, drawing a profile, and eating an abridged dinner, the descending sun warns us that it is time to go. We first deposit an A. M. C. bottle with our record, and then begin the descent directly down the precipice. This plan was adopted to shorten the struggle along the ridge, but it is not to be recommended. At 5:45 P. M., we reach the brook 60 metres (200 feet) above where we left it. In a few minutes we reach the junction of the two streams, and at 6:35 are at the top of the Flume. A few minutes after finds us at the Flume House after a most successful

trip, and one strongly to be recommended to all lovers of the woods, the mountains, and fine views.

Mt. TREMONT¹ (SEPT. 4, 1876). BY J. B. HENCK, JR.

Starting from the Intervale Station on the 7:20 A. M. train, we reached Upper Bartlett at 7:54. Thence by the stage road a walk of 3.2 kilometres (2 miles) brought us to Sawyer's Rock, and 1.2 km. ($\frac{3}{4}$ mile) farther on, at the second bridge beyond the rock, we left the road to follow up a large brook which here crosses it. Following this brook about 2 km. ($1\frac{1}{4}$ miles) it divides into two streams of about equal size, and we followed the right hand one. At a distance of 4.1 km. ($2\frac{1}{2}$ miles) from the road, having ascended about 350 metres (1100 feet), we left the brook and took to the ridge on our right. Following this ridge 1.4 km. ($\frac{7}{8}$ mile), we reached the col between the northern summit (not shown on the map in Appalachia No. 1) and the middle summit (O. 6. 2), and turning to the left 0.5 km. ($\frac{1}{2}$ mile) more arrived at the middle summit, which we reached two hours and a half after leaving the road, — distance 6 km. ($3\frac{1}{2}$ miles), ascent 700 metres (2300 feet). Here we had a fine view to the east down the Upper Bartlett valley. But the highest summit (O. 6. 1) still lay about 1.6 km. (1 mile) to the south of us, and to reach it we had to descend about 15 metres (50 feet), and then ascend about 60 metres (200 feet). We found the whole space between the two summits covered with fallen trees, which appeared to have been killed by fire and then blown down, falling across each other like giant jackstraws; so that instead of being twenty minutes as expected, we were fifty minutes in reaching the southern and highest summit. Here we had fine views of the Saco and Swift river valleys and the mountains on all sides.

After depositing a record bottle and eating our lunch, we started directly down from the southern summit, taking a course nearly at right angles to the ridge joining this summit with the middle one, keeping on the ridge to the right of the brook by which we ascended until we had descended about 300 metres (1000 feet), and then taking to the brook. When we were within perhaps 1.5 km. ($\frac{3}{4}$ mile) of the road we discovered on the right bank, at a point where a small ravine branches off, the remains of a rude camp and fire, and leading downward from them a rather poorly marked path, which we followed to the road, coming out a few rods south of the bridge where we had left the road.

Mt. Tremont rises from the west bank of the Saco just south of the point where it is joined by Sawyer's River. It consists of a ridge about 2.5 km. ($1\frac{1}{2}$ mile) long on the top, trending nearly north and south, and slightly concave to the eastward, and has three summits. The southern

¹ The figures given in this account are all based on observations made by Mr. W. H. Pickering, who was one of the party.

summit rises (by measurement with an aneroid barometer) about 1000 metres (3250 feet) above the sea, the middle one 950 metres (3100 feet), and the northern one (estimated) about 900 metres (3000 feet). At the southeast it is joined to Mt. Silver Spring, at the south it sends out a spur (marked 6.3 on the map, but which should be 6.4, as the northern summit not shown is the proper 6.3), at the west it is joined to a low range of hills forming the water-shed between Sawyer's and Swift rivers, while the remainder of its base is skirted by the Saco and Sawyer's rivers. A small ridge projects from the southern summit in a direction a little north of east, and a very heavy one from between the middle and northern summits in a northeasterly direction, spreading out to the east as it descends, so as to partially enclose a sort of basin under the ridge connecting the middle and southern summits. From this basin flows one branch of the brook above mentioned, the other branch coming from the notch between Mts. Tremont and Silver Spring. The upper part of the mountain is very steep all round, but especially on the easterly and westerly slopes of the middle summit and the portion south of it and on the south end, on which portions the average slope for nearly 300 metres (1000 feet) down must be, I should think, between 35° and 40° . In one place where we measured the slope we found it to be 46° .

Officers for 1877.

President, SAMUEL H. SCUDDER.

Vice-President, CHARLES E. FAY.

Secretary, J. B. HENCK, JR.

Treasurer, H. F. WALLING.

COUNCILLORS :

Natural History, T. STERRY HUNT.

Topography, J. RAYNER EDMANDS.

Art, JOHN WORCESTER.

Exploration, C. H. HITCHCOCK.

Improvements, W. G. NOWELL.

Active Members.

(Added since June, 1876.)

Agassiz, Alexander, Cambridge, Ms.	Hollingsworth, Sumner, So. Brain-
Baker, Miss Ellen J., Boston, "	tree, Mass.
Balch, Edwin S., Cambridge, "	James, Thos. P., Cambridge, Mass.
Blatchford, John S., Boston, "	Kidder, Frederic, Boston, "
Brown, Geo. L., So. Boston, "	King, C. J., U. S. Signal Service.
Butler, G. Arthur, Hanover, N. H.	Knowles, Miss M. A., Boston, Mass.
Churchill, Joseph R., Boston, Mass.	Lowe, Chas. E., Randolph, N. H.
Davis, Wm. M., Jr., Cambridge, "	Meredith, Miss C. K., Philadel'a, Pa.
Dunphy, James W., Boston, "	Merrill, Geo. N., Jackson, N. H.
Eastman, Sam'l C., Concord, N. H.	Pickering, Mrs. L. S., Camb'dge, Ms.
Edmands, Miss E. R., Salem, Mass.	¹ Putnam, F. W., " "
Fenollosa, E. F., " "	Russell, E. H., Worcester, "
Gannett, Wm. C., Boston, "	Stimson, F. J., Dedham, "
Gilbert, C. C., " "	Walker, C. H., Boston, "
Hagar, Eugene B., " "	Winslow, Miss F. E., Brooklyn, N.Y.
Hale, Miss Susan, " "	Whitman, Miss M. F., Lexington, Ms.
Henck, John B., " "	

¹ Omitted by mistake from the first list.

Proceedings of the Club.

July 26, 1876 — First Field Meeting, held at North Conway, N. H.

President Pickering in the chair.

Mr. W. G. Nowell described the new path up Mt. Adams, made by Mr. Charles E. Lowe, of Randolph.

Mr. J. R. Edmands showed a saddle for carrying a pack upon the back while walking. Also the camera obscura shown by him at the June meeting of the Club, together with some views since sketched by its aid.

President Pickering showed a new instrument for measuring heights of mountains, etc., designed by himself and called a micrometer-level.

Mr. Geo. C. Mann showed a contour map of the United States, which he had colored to bring out the topographical features of the country.

After some discussion of the position taken by the Club with regard to the names of certain mountains, the following resolutions, offered by Rev. John Worcester, were adopted: —

Resolved: That, while the Club feels the necessity of having definite and unambiguous names for the mountain peaks, it disclaims all intention and desire to interfere unnecessarily with well known names of the mountains.

Resolved: That, in giving names to natural objects hitherto unnamed, and in selecting among several names applied to the same object, the Club desires to pay the fullest respect to the local preferences of the inhabitants, recognizing them as the persons most interested in the subject.

Prof. C. H. Hitchcock read a paper on the Geology of the White Mountains (see p. 70), illustrating it with maps and profiles colored to show the geological structure of the mountains.

The peculiarity common to many New Hampshire hills, of being much steeper on the southerly or south-easterly slope than on the opposite side, was mentioned, and Prof. Hitchcock said he had no doubt that it was due to the action of the ice during the glacial period, which moved in a southerly or south-easterly direction, and in passing over a hill would naturally carry with it any loose fragments there might be on the down-stream side; or if the rocks were cracked the pressure of the ice would more easily break off fragments on that side than on the other.

On Thursday, July 27, a party of thirty ladies and gentlemen ascended Mt. Kiarsarge, or Pequawket. The ascent was made by a path not generally known, which leaves the road from North Conway to Bartlett about opposite Mr. Tasker's boarding-house, and, about two-thirds of the way up Mt. Bartlett, joins the path from the East Branch House, thence following the latter over Mt. Bartlett to Mt. Kiarsarge.

On Friday, July 28, an excursion was made to the Fabyan House and back by special train over the Portland and Ogdensburg Railroad. The

train waited at the Crawford House, on the way up, long enough for parties to ascend Mt. Willard and return; then going on to the Fabyan House, and returning direct to North Conway. About 175 persons made the trip.

October 11, 1876. — Sixth Regular Meeting.

President Pickering in the chair.

Mr. Nowell spoke of a gift of \$30 from Mrs. Jared Sparks to the Department of Improvements. The following vote was passed: —

Voted: That the Secretary be requested to extend to Mrs. Sparks the thanks of the Club for her generous gift in aid of the Department of Improvements.

The resignation of Mr. L. F. Pourtales as Councillor on Exploration, was read and accepted; and Mr. J. Rayner Edmonds was elected to fill the vacancy.

Mr. Nowell read a paper describing an exploration of Carter Dome (see p. 76).

Mr. W. H. Pickering read a paper on the Distant Points Visible from Mt. Washington (see p. 86).

Prof. C. E. Fay read a paper on the name of Black Mt. (see p. 90).

Mr. Edmonds read a paper on King's Ravine (see p. 93).

November 8, 1876. — Seventh Regular Meeting.

President Pickering in the chair.

Vice-President Scudder offered the following amendments to Art. III. of the Constitution; first, omit the words "must be residents of New England and"; second, omit the final clause and substitute the following: "Corresponding members may be chosen from among persons engaged in geographical work or mountain exploration. Honorary members, not exceeding twenty-five in number, may be elected from among the Corresponding members."

The amendments were passed to a second reading.

Mr. W. G. Nowell reported explorations which had resulted in determining with considerable accuracy the upper and lower limits of twenty-eight of the flowering plants growing on the Great Range, and also the fact that the so-called scrubs found on the White Mts. above the level of four thousand feet, were *Abies balsamea*, or fir, and not *A. nigra*, or spruce. He said that a species of spruce was found above the scrub-fir, but it only grew to a height of six to twelve inches, and did not constitute a real scrub.

Mr. Edmonds showed a number of sketches made during the past summer with the aid of his camera obscura.

There was a brief discussion of the question whether Mt. Katahdin was visible from Mt. Washington.

President Pickering described his work during the past summer in de-

termining the heights of numerous points among the White Mts. with his micrometer-level.

Mr. J. B. Henck, Jr., read a paper on the Application of Photography to Mountain Surveys (see p. 97).

Prof. H. F. Walling showed proof-sheets of the new State map of New Hampshire, which he is about to publish.

Mr. Nowell reported some plane-table work done by himself and Mr. Edmands on or near Mt. Adams.

December 13, 1876. — Eighth Regular Meeting.

President Pickering in the chair.

The amendments to Art. III. of the Constitution offered at the last meeting were read the second time and passed.

Mr. Nowell, as Councillor in the Department of Improvements, made a report of progress (see p. 109) and showed the record made by visitors on Mt. Adams in the bottle placed there by the Club for that purpose. He also showed the Club's blazing hatchet and stencil for marking paths.

Mr. Edmands sent a report on the Department of Exploration (see p. 117).

Mr. Geo. C. Mann, Col. C. W. Folsom, and Dr. W. B. Parker were appointed a committee to make nominations for officers for the ensuing year.

January 16, 1877. — Ninth Regular Meeting.

President Pickering in the chair.

Officers for the ensuing year were elected (see p. 126).

President Pickering, on retiring from the chair, delivered the address printed on page 63.

In the absence of President-elect Scudder, Vice-President Fay took the chair.

The Secretary and Treasurer read reports which are printed on pages 107-109.

On motion of Mr. Walling, it was voted that the thanks of the Club be tendered to the officers of the Mass. Institute of Technology for the use of the room in which the meetings of the Club have been held.

A letter was read from Mr. M. F. Sweetser, asking the assistance of members of the Club in correcting any errors or supplying any omissions which they might have discovered in Osgood's White Mountain Guide Book, preparatory to the issue of a second edition.

Mr. G. C. Mann showed several contour maps which he had colored so as to bring out the principal features of the topography.

Prof. J. H. Huntington read a paper on the Flowering Plants of the White Mts. (see p. 100).

Several cases of poisoning were spoken of by Messrs. Mann and Worcester, which were attributed to the drinking of water coming from swampy places in which certain species of *Veratrum* were growing.

On the other hand, Mr. Nowell stated that he had often, in company with others, freely used water coming from swamps containing an abundance of *Veratrum* without any ill effects.

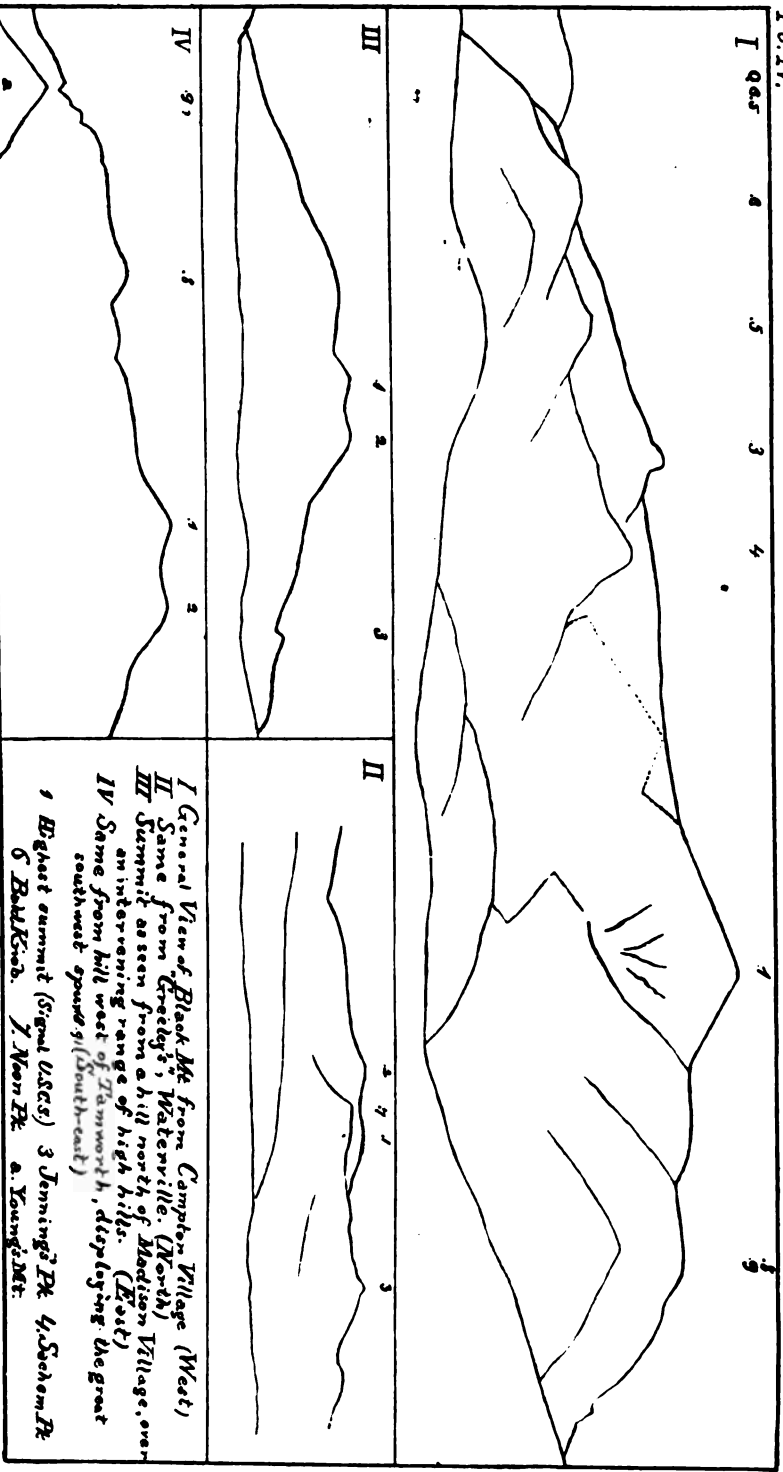
He suggested the following table for collection of statistics which may enable us to find contour lines for the two botanical regions designated as alpine and sub-alpine, and to increase and systematize our knowledge of the flora of the White Mts. In the fourth column should be entered statements as to abundance, soil, moisture, light, shelter, etc. The use of the other columns is indicated by their headings.

<i>Botanical Name.</i>	<i>Locality.</i>	<i>Elevation.</i>	<i>Remarks.</i>

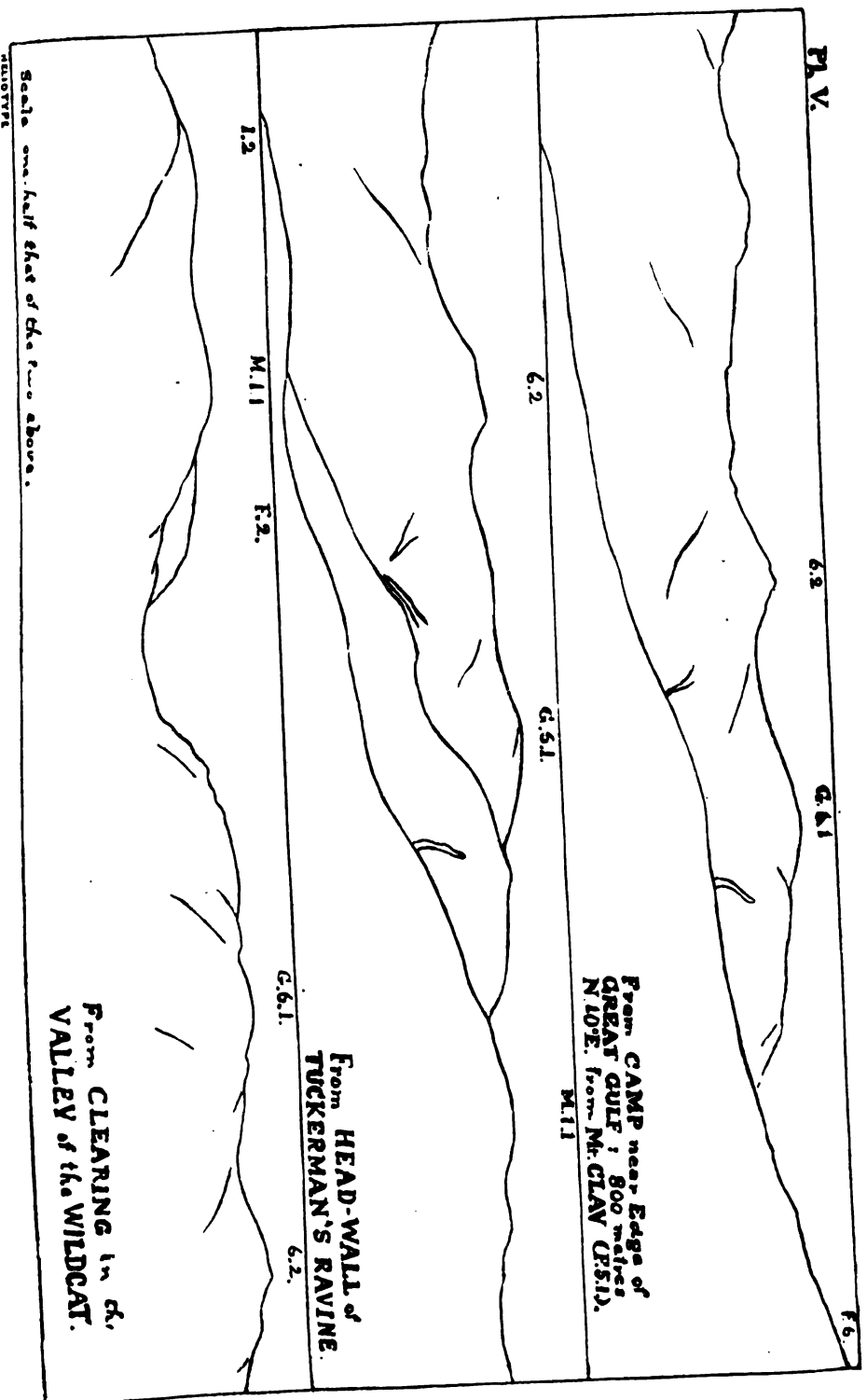
Maj. J. W. Powell spoke of the volcanic regions of the West, and the formation of volcanic mountains.

Mr. R. W. Greenleaf called attention to a specimen number of the "Wild Flowers of America," now being published by H. O. Houghton & Co.

Pl. IV.



I General View of Black Mt. from Campden Village (West)
 II Same from Greely's, Waterville. (North)
 III Summit as seen from a hill north of Madison Village, over
 an intervening range of high hills. (East)
 IV Same from hill west of Jamworth, displaying the great
 southwest spur(s). (South-east)
 1 Highest summit (Signal U.S.G.S.) 3 Jennings' Pk 4, Seaborn Pk
 5 Bull Knob. 7, Neon Pk 8, Young's Mt.



PL VI

CARTER DONE.

WILDCAT.

6.2

6.1

M.1

1.2

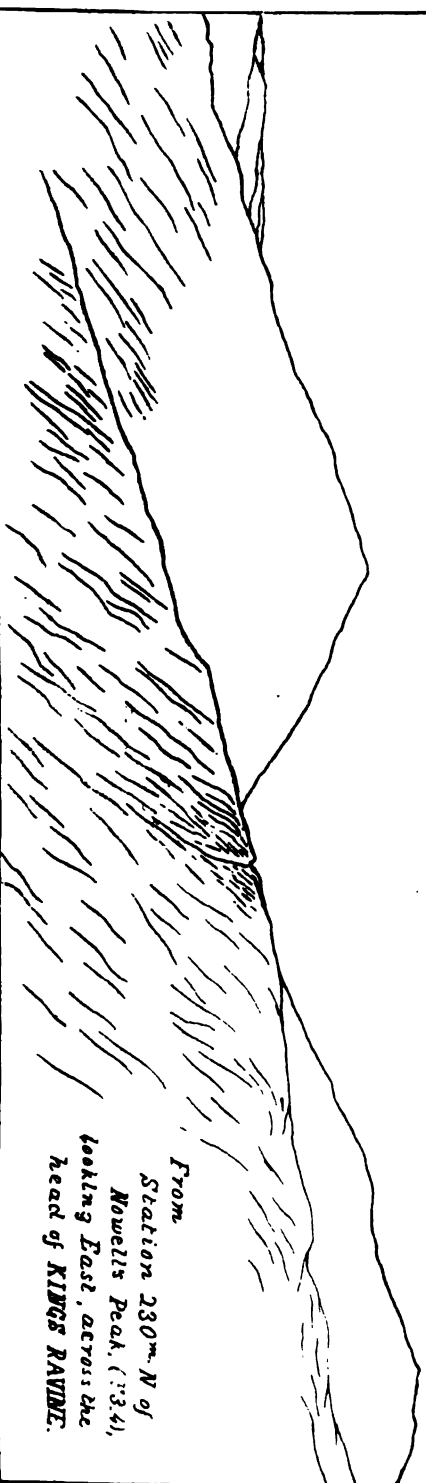


From

MADAMS (F.3.1)

looking South-East

(NB. Heights uncertain on original drawing)



From

Station 230^m N of

Nowell's Peak, (F.3.4),

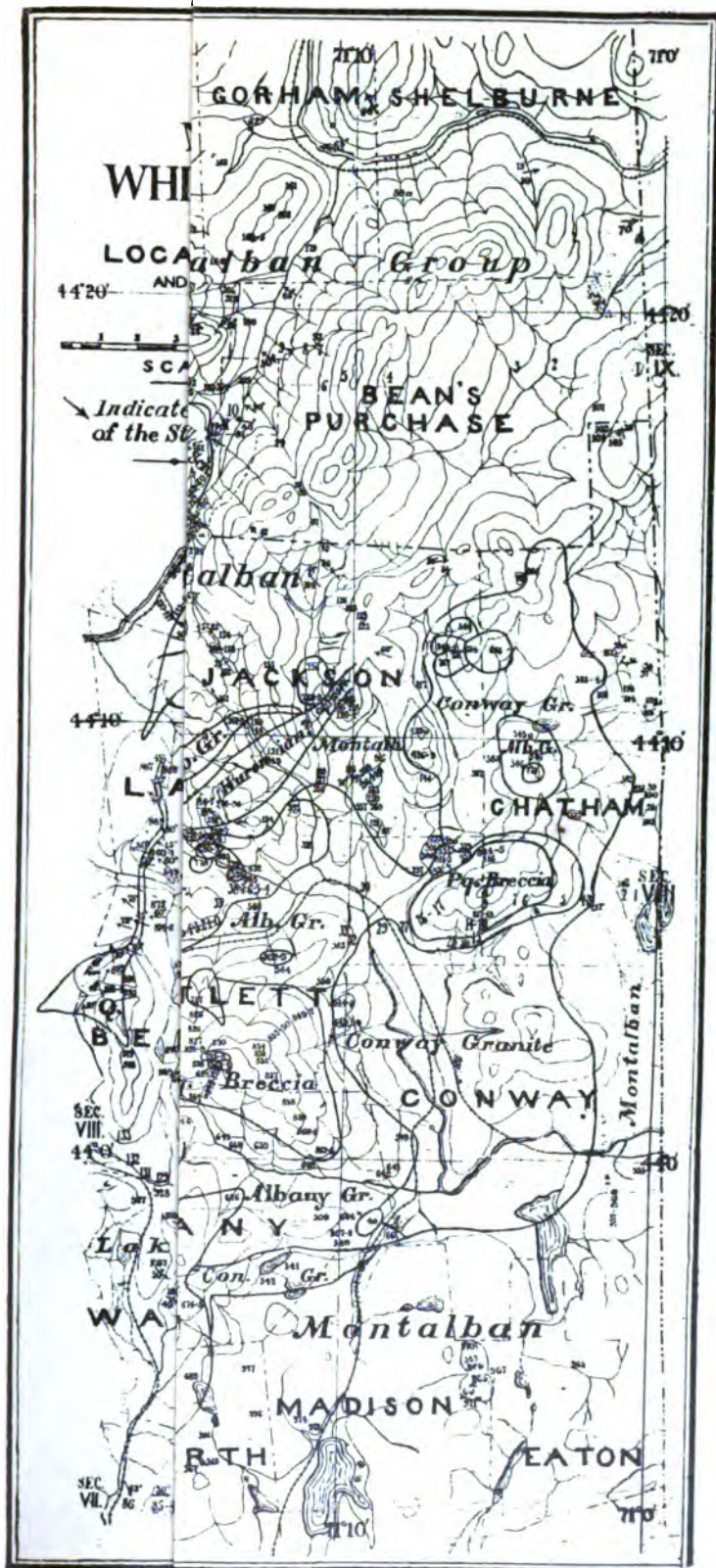
looking East, across the

head of KINGS RAVINE.

HEIGHTS

MADISON (F.2).

J. Q. ADAMS (F.3.3).



APPALACHIA.

VOL. I.

BOSTON, JUNE, 1877.

No. 3.

A Climb through Tuckerman's Ravine.

BY MISS M. F. WHITMAN.

Read February 14, 1877.

The retiring address of our late President, in its appeal to members of the Club for reports of their mountain work and experiences, even though unscientific, has emboldened me to offer you an imperfect account of a personal adventure among the White Mountains.

The attendant circumstances would have prevented accurate measurements of heights or distances in metres and kilometres, the taking of angles, or drawing of profiles, even had I been able so to do. Leaving that kind of work to those who have shown themselves not only able but willing to do it, I will confine myself to my narrative.

Our party had been camping among the mountains several weeks, our plan of operations being to select a good campground in an interesting locality, and with that as a base to make excursions to the various points of attraction in the neighborhood, and, in good time, to move on to another spot. In the middle of August we had reached the Glen House, and were in camp on the clearing close to the Peabody River.

From this point one of our excursions, as a matter of course, was to Crystal Cascade and Glen Ellis. The tramp down the Notch Road was delightful; light fleecy clouds slightly obscured the sun, and the freshness of Nature, clean-washed by last night's shower, made every breath a delight. Emerald Pool, with muddy waters stirred up by the rain, showed no

right to its name; but Thompson's Falls had gained a beauty from the same source, and the swollen waters leaped and danced with bewitching loveliness.

The grandeur of Glen Ellis, with its unbroken leap, held us entranced so long that it was past noon when we found ourselves back at Crystal Cascade.

While discussing our lunch on the precipice above, just out of reach of the guide-book tourist, one of the gentlemen of our little party, who had often been our leader in exploration, challenged us to follow up the stream to the snow arches in Tuckerman's Ravine. I had long desired to explore this region, and, feeling great confidence in his powers as well as my own for the work, without hesitation announced my readiness to start upon the instant. The rest not feeling inclined to join, we left our heavy wraps with them to be taken back to camp, and divested ourselves of all but the most necessary luggage, which little we carried slung to our belts.

At a little past two o'clock we started, promising to be back in camp at dark with true mountain appetites for a hot supper.

As has been stated at former meetings of the Club, the old path is considerably overgrown, and in many places the blazes are obscure, but we rambled leisurely along, every step a revelation of beauty such as is only seen in the deep recesses of the unbroken forest. Rank beds of fern covered with a veil of loveliness the scars left by trees uprooted by the winter's storms, the beautiful *Linnæa* in many places bordered the path, orchids, both old friends and new, seemed to spring up in every direction luring us from our way in our eager search for floral treasures, beds of starry *Oxalis* tempted us to stop and revel in their beauty; while our indolence was awakened by the dainty upholstery of soft green mosses on huge old logs. But amid all these temptations we did not lose sight of our object. It was a constant climb, but so filled with delight, so brimming with invigoration and excitement, that we heeded not the work or the passing hour.

Neither did we heed what afterward proved a serious matter for us.

As we came out of the forest upon the cleared space just

above Hermit Lake, we observed for the first time that the sky had become clouded, and a dense blackness was fast settling down upon the Ravine. The solitude of the place was awe-inspiring, the walls of the ravine rising so steep in front and on either side, the unbroken forest behind, and below us a lake whose black stillness seemed weird and dreadful. No wind seemed to ruffle its inky surface though the clouds were scudding rapidly over our heads. But we did not tarry long, neither was there a word said about turning back. We were accustomed to accomplish whatever we attempted, and the casual glimpses of the snow beyond, apparently so near, but which we found so far, encouraged us on.

We rapidly passed through the low growth of wood just beyond the lake, reached the alders and were soon utterly lost. To those who have never travelled that road it is impossible to convey any definite idea of its horrors; added to the natural difficulties of the way, we had hardly struck into the alders when the clouds shut in around us, drenching us to the skin and weighing down the bushes so as to obliterate all traces of previous footsteps.

We floundered about wildly, first on one side, then on the other, the wet alders lashing us with icy boughs as if resenting our efforts to force a passage.

We were finally compelled to take to the middle of the stream. At first we jumped from rock to rock, trying to keep our feet from the waters fresh from beds of ice. But we soon plunged boldly in, wading as we might, knee-deep and sometimes deeper. Those who are familiar with that stream — or those streams, for it constantly divides — remember that it is filled with boulders, some of them completely blocking the way. It is not pleasant to boost another up a slippery rock in the face of an ice-cold cascade, but this I frequently did and was pulled up afterwards, having but one boast to make for my part of the work, that in no case did I require assistance where I had not also to give it.

Out of the alders the snow arches seem close at hand, but benumbed with cold, weighed down with wet clothes, and with clouds freighted with rain dashing in your face, the scramble over the rocks is neither easy nor agreeable. I fear

our course from Hermit Lake to the arches could hardly be called a pleasure walk, neither can we boast of our walking time, but at last we accomplished it and stood sheltered beneath a roof of ice and snow.

Under some circumstances it might have seemed a shelter in fairy land, and we should have lingered long, as we have since done, in examining its wonders. Above, the vaulted roof studded with a million projecting points, from each of which ran a tiny stream or hung a glistening drop; beneath, the streams dancing over the rocks, and the whole interior lighted by that strange greenish light which penetrates the roof; before the entrance, within a radius of a hundred yards, a fine procession of flowers, from the curiously folded *Vera-trum* just piercing the frozen ground at the edge of the ice, to the Golden-Rod of late summer.

But now it seemed rather an abode of demons. The Thousand Streams had become foaming torrents, and rushed down the precipice above us and through the ice caverns with a deafening roar. The winds howled, the clouds thickened and thickened as the storm every moment increased, and the black walls of the Ravine seemed to be shutting us in closer and closer.

For the first time I fully realized our situation. Night was coming on, we could hardly reach the woods before darkness would be upon us, the only implement we had for building a shelter was the knife I wore in my belt, our stock of matches had become wet, and dry wood was not to be found. Our provisions consisted of two hard crackers and a very small pocket-flask, with not more than a spoonful of brandy, and to increase the danger we were wet to the skin and shaking with cold. All this passed rapidly through my mind, but what was in the mind of my companion I knew not, for little had been said during the last hour and I would not by a question indicate to him that I had the slightest anxiety. At last he broke the silence. "To return is impossible; our only hope is to reach the top. Are you equal to it?" With no conception of the further difficulties before us, but reading the necessity from the tone and look of my companion, I answered, "I think I am," and without delay we started.

We knew nothing of the path from the Ravine to the top, and had no time to explore. All this time the clouds had been falling lower and lower, covering the tops of the cliffs and even obscuring their sides. But as we stood facing down the ravine we discovered on our left what seemed to be the bed of a spring torrent or the track of a slide. We selected this for our attempt. Up, up we went, clinging to twigs of spruce and willow, or when those failed us to the very grass and ferns; often on our hands and knees, sometimes pushing and pulling each other in turn; carefully, for every step sent loosened stones bounding down, warning us by the sound how far a misstep might send us; often finding our way blocked by some steep cliff or huge rock whose vertical face offered us no hold for foot or hand, then a climb around to one side and then the other to find a way, but always up, till, at last, a climb which I cannot now look back upon without a shudder and which later examination convinces me we never could have accomplished had not our haste prevented our looking back and the darkness obscured the danger of the way, was ended.

But our perils were not yet over. As soon as we were above the protecting walls of the ravine the storm struck us with its full force, compelling us to cling to each other for support. Night was hard upon us, and the clouds so dense we could hardly see a dozen rods ahead.

There was no time to be lost, and scarcely stopping to take breath we turned in what we supposed to be the direction of the carriage-road. Almost immediately we were plunged into that dense sea of scrub which lies between the road and the ravine on the north-easterly side. We floundered helplessly, the wind driving us and the scrub with its Briarean arms dragging us in. At last we escaped, and hastily retraced our steps to the edge of the ravine. Again we started — this time following around the head of the ravine and striking off in a north-westerly direction, as nearly as we could guess, for the old Crawford Bridle Path, with which we were somewhat familiar, having passed over it but a few days before.

Let me say in passing that I speak of directions and locali-

ties from information afterwards gained; at the time I had no idea of the direction of the summit, the road, or the path, and knew not the intention of my companion, for little was said; he took the lead, and I followed blindly.

Occasionally fierce gusts laden with sleet would strike us, compelling us to crouch and cling to the very rocks.

Bareheaded and with skirts close reefed, on we went, not daring to stop a moment in our chilled condition, knowing the necessity of speed, yet realizing the dangers of bewilderment and that a single misstep on those icy rocks might end in disaster, hardly daring to hope we were steering in the right direction, when suddenly, as our courage was at its utmost tension, and our helplessness in the face of the furious elements, and our loneliness on that mountain waste more and more drear in the gathering blackness, had become almost appalling, the clouds parted for a moment, revealing directly ahead of us the unmistakable outline of the summit of Mt. Munroe.

With a cheery "We are all right," on we went with renewed courage, changing our course as much as we dared toward the summit, but with slower and more careful steps in the increasing darkness, until at last we came to a ridge of stones apparently thrown up by human hands, over which we stumbled, and found ourselves in the Bridle Path. We were not a moment too soon, for our strength was nearly exhausted, and it was now so dark we could hardly distinguish each other's faces.

For the first time I knew where we were, and though remembering the difficulties yet before us felt that we were safe. A sigh of relief was the only outward expression of feeling from a heart too grateful for speech.

Many of you are familiar with that last mile up the cone, and will appreciate the difficulties of travelling it by night in the blackness of a furious storm. How we did it I cannot tell. I only remember that we felt every step of the way — sometimes on foot, often on hands and knees — and that somehow we reached the old corral, the end of the Bridle Path. Here sheltered slightly from the force of the storm we rested for a moment, and I was at last allowed the spoon-

ful of brandy which to this time had remained untouched in our flask — my companion dryly remarking that Lizzie Bourne perished even nearer the summit than we were. We soon left the corral and slowly dragged ourselves over those huge boulders which surround the immediate summit, with nothing to guide us save the sense of feeling and the knowledge that we must go up.

So thick was the night that we struck the platform which surrounds the house before we discerned a gleam of light. We hesitated a moment with a realizing sense of our ludicrous appearance, but finally opened the door and stood, — halless, with remnants only of shoes, stockings, and skirts, before the wondering crowd which surrounded the blazing fire.

Our kind host came at once to our relief, furnished us with dry clothes, hot food and drinks; and after a telegram had relieved our anxious friends and stopped a party of men from the Glen House who had started out with guides and lanterns to search for us, we were soon oblivious of our perils in that slumber which only comes to mountain climbers.

In the early morning a mountain wagon and six black horses — detained overnight on the summit by the storm — took us, the only passengers; and, driving at a gallop, we drew up in style in front of our camp to breakfast with our overjoyed friends.

At another time our whole party visited the Ravine by the same route, cut a path through the alders to the snow arches, and built a camp at Hermit Lake. At this time our explorations were favored by fine weather, and we enjoyed wonderful views of that natural coliseum by moonlight which only the pen of a Byron can fitly describe.

The Micrometer Level.

BY E. C. PICKERING.

Read November 8, 1876.

During last summer my work for the Club was mainly in the direction of topography. From Jefferson Hill, the Flume House and Jackson as headquarters, trips were taken

to various points from which extended views were obtainable. The vertical and horizontal angles of all the principal summits visible were then measured by a micrometer level. This instrument consists of a surveyor's level with one end of the telescope on a hinge, and the other end supported by a micrometer screw. Instead of using a tripod, the instrument rested on a small cast-iron triangle, and was placed directly on a projecting rock. Great steadiness was thus obtained. The instrument in its box weighed about twelve pounds, or fifteen pounds with the additional protection required for the more exposed summits. The probable error of the vertical angles was only about 6", that of the horizontal angles about 4'. The readings were made very rapidly, almost as fast as a companion could record. When alone on a mountain and making my own records, 72 vertical and 58 horizontal angles were measured in 46 minutes, or at the rate of 170 per hour. The positions of the stations, with the number of vertical and horizontal angles observed, are given below:

	<i>Vertical angles.</i>	<i>Horizontal angles.</i>
Israel River Bridge	30	27
Plaisted House (piazza)	65	56
" " (window)	241	67
R. R. Bridge, Lancaster	43	43
Hill near Jefferson	32	31
Bray's Hill	105	107
Jefferson Hill	67	62
Boy Mt.	75	74
Starr King	118	115
Owl's Head	146	135
Mt. Adams	223	215
Mt. Pleasant House	40	34
Mrs. Pendexter's, N. Conway	71	57
Intervale Station	20	15
Northern Kearsarge (P. 1. 1)	194	178
Mt. Pleasant	123	109
Mt. Washington	70	66
Mt. Jefferson	260	208
Twin Mt. House	64	53
Flume House	18	20
Mt. Pemigewasset	76	70
Mt. Lafayette	185	164
Mt. Liberty	172	151

	<i>Vertical angles.</i>	<i>Horizontal angles.</i>
S. Doublehead C. S.	139 . . .	111 . . .
N. Moat	200 . . .	184 . . .
S. Moat	87 . . .	85 . . .
Chocorua	119 . . .	113 . . .
Conway Corner, R. R. Station	27 . . .	24 . . .
Thorn Mt.	155 . . .	138 . . .
Mt. Willey	197 . . .	190 . . .
Glen Station	53 . . .	48 . . .
Bemis Station	7 . . .	11 . . .
Upper Bartlett	28 . . .	26 . . .
Iron Mt.	83 . . .	80 . . .
Thorn Mt. House	41 . . .	37 . . .

The total number of vertical angles observed during my stay at Jefferson Hill was 1145, of horizontal angles, 932. On the trip to attend the field meeting of the Club, 802 vertical, and 720 horizontal angles were measured. At the Flume House, during a week's visit, 451 vertical, and 405 horizontal angles were taken, and at Jackson, 1136 vertical, and 1047 horizontal. In all, 3534 vertical and 3104 horizontal, or 6638 angles. The portability and rapidity of the instrument is shown by the fact that in almost every case, leaving the hotel in the morning, the mountain was ascended, the observations taken, and the return effected, before dark. The observations were therefore made during the three or four hours which could be passed on the summit.

In one case only, on Mt. Adams, was a night passed in camp. Two other trips occupied two days. Leaving the Mt. Pleasant House in the morning, Mt. Pleasant was reached by the Crawford Path, and the night spent on Mt. Washington. An early start the following morning gave us a morning on Mt. Jefferson, and an hour or so on Mt. Adams. I reached Jefferson Hill the same evening on foot, at about nine o'clock. This amount of work would have been quite impracticable without the aid of my friend Mr. G. C. Mann, in recording the observations and helping carry the micrometer level. On the other two-day trip, leaving Jackson in the morning, and taking the cars to the Intervale Station, we reached the top of N. Moat at an early hour. A walk over the ridge to S. Moat, across the Swift River and over the eastern ridge

of Chocorua, brought us to the foot of that mountain by nightfall. The next day we ascended Chocorua, walked back to Conway Centre, and returned by cars and stage to Jackson the same evening. This trip gave 839 angles, 556 on the first day. Of the other trips, the ascent of Mt. Liberty is described in *APPALACHIA* No. 2, p. 122, and that of Mt. Willey, p. 120.

The other methods of determining mountain elevations are by levelling, by measuring vertical angles with a theodolite, and by a barometer or boiling-point apparatus. The first of these can seldom be used from its slowness, as often several days would be required to determine the height of a single summit. The second method, which is that employed by the Coast Survey, differs from the one described here only in the form of instrument used. A more expensive and heavier instrument is required, and the work is much less rapid. As the uncertainty of atmospheric refraction is the principal source of error, the advantage of the superior accuracy of the larger theodolites is lost. The shorter lines of sight employed with the micrometer level, owing to the greater frequency of the stations occupied, give it also a marked advantage. The barometer is open to the objection of large errors, and requires a visit to every point to be measured. A comparison of the work of the two instruments shows that more elevations can be determined with the micrometer level in a single day, than in a whole season with the barometer, and the errors will also be much less with the former instrument. A traveller may determine the altitudes of an entire group of mountains by ascending two of them and reading the angles with a micrometer level. The horizontal angles will furnish their position, and the vertical angles will give two independent measurements of their altitudes. It is of course necessary to determine the horizontal positions of two, and the altitude of one, observed point.

A Trip to Mt. Mitchell in North Carolina.

BY GEORGE DIMMOCK.

Read February 14, 1877.

As the White Mountains form an irregular knot of high peaks near the northern end of the Appalachian mountain system, so the Black Mountains, near its southern extremity, are in a cluster of not much less complexity. This Black Mountain group contains several of the highest mountains in the whole Appalachian system, and although my subject as announced limits me to a consideration of the highest one of these mountains, properly called Mitchell's Peak, yet I wish to start with you to that mountain from the boundary line of Tennessee and North Carolina, where the railroad ends in that direction, and to leave you again at a railway station east of the mountains, in order that I may give you, first a general idea of the mountainous portion of western North Carolina, a region no less beautiful than the White Mountains, and secondly that I may explain how to get to Mt. Mitchell through a region where not one person in ten can tell anything about the roads which are more than a dozen miles from his own home.¹

The last station at the southern end of the Cincinnati, Cumberland Gap and Charleston Railroad, so far as it is at present completed, is Wolf Creek. This is nearly on the boundary between Tennessee and North Carolina. The station has no companion-buildings within a radius of half a mile, and, at the end of a railroad, the time-table rate of which was four hours for a distance of forty miles (i. e., from Morristown, Tenn.), one feels a sense of loneliness as he takes a parting look from the stage window at the rickety locomotive.

This was the fourth of last August. A professor of mineralogy from Pennsylvania was to be my companion a part of the way. We took dinner at a little hotel about three quarters of a mile from the station, and then went on by stage to

¹ For a further description of the mountains of the State, see *The Mountain Region of North Carolina*, by Christian Reid. *Appleton's Journal*, [N. S.] Vol. II. pp. 193-204.

Warm Springs, a favorite summer resort for southern people. We were now fairly in the mountainous region, the flat valley of the French Broad River had been left behind, and, from the comparatively level strata of the rocks of eastern Tennessee, we had plunged into a turbulent sea of azoic formations. The mountains about us were irregular in position and in structure. Between Warm Springs and Wolf Creek the French Broad River breaks through the Alleghany Mountains, which are called Smoky Mountains on the south and Bald Mountains on the north of the river.

Warm Springs consists chiefly of a large hotel, where, as is usual at hotels in that part of the South, good meals are served. The springs, from which the place takes its name, are of a temperature of about 40° Centigrade, contain sulphur and are used for bathing. They spring up from the very edge of the river and even under its waters. Near the hotel are chalybeate and other springs.

After spending the night and a part of the next day at Warm Springs, we started on the road to Marshall. We walked on all the afternoon, failing to secure any dinner, for the poor whites living along this road had either sold their corn for whiskey, as is customary with them, and would have no more till the new crop was harvested, or else they were ill-disposed to strangers. The latter supposition seemed less probable, for one can purchase a meal at almost any house in the South. We finally obtained a scanty supper at a log cabin, after its occupants had once refused to furnish us any, by asking them about the mineral resources of the region, and talking mineralogy with them a little while. Upon the subject of precious minerals almost all the poor whites are monomaniacs. One of them will often have a few crystals of pyrites carefully wrapped up in a rag. He will silyly let you look at it, and then tell you that he "reckons he can tell whar there's heaps on't," but never tells.

But if we could not feast our stomachs with corn-cakes, — or pones, as they are there called, — the standard food in that region, we could feast our eyes on the beautiful scenery which we passed.

The French Broad, here a stream of a hundred or two

metres in breadth, dashed along between steep hills, often leaving little room for the road, and at every turn in the path some new combination-scene of the tree-clothed hills with the rushing torrent below surprised our eyes.

At a closer view there was little in the vegetation that differed strikingly from that of New England hills, except here and there one of the Magnoliaceae, a buckeye, a persimmon tree, or a chinquapin bush. Occasionally the little skinks and swifts, kinds of lizards, would rattle off through the brush, much in the same way and about as quickly as a striped squirrel dashes to its hole in the New England woods. The swift, a little striped lizard, is, by a strange perversion of language, called a "scorpion" in Virginia, Kentucky, Tennessee, and North Carolina, and its bite is greatly dreaded, while the skink, with sharper teeth and stronger jaws, is thought to be harmless.

When we arrived at Marshall, which is sixteen miles from Warm Springs, a new difficulty awaited us. It was about eleven o'clock at night, and nearly every one had gone to bed. We were directed finally to the hotel, which was, to all appearances, a dwelling-house. To it we went. Upon rapping, the gruff-looking proprietor put his head out of an up-stairs window. He evidently did not care for business, since he persistently denied that his house was the hotel. We afterwards learned however that it was. Fortunately we soon found a place to stop with Mr. Haney, keeper of the principal store in the village, and after we had made his acquaintance and learned how familiar he was with the vicinity, we did not lament being turned away from what proved to be a third class hotel, although the only one in the place. I would recommend any members of the Appalachian Club, who may be travelling in this region, to make the acquaintance of Mr. Haney and also of Dr. Hardwick, in Marshall. Both are intelligent men, know well the points of interest in the vicinity, and have no axe of their own to grind.

As my friend the professor could not go further with me, we spent a few days about Marshall, in search of mineralogical and entomological specimens. The whole country around Marshall, for about fifteen miles, is elevated, descending to

the river and creeks by steep banks. Magnetite and other iron ores are abundant, but there are of course no coal-beds near, and no railroad within twenty-four miles, so the iron deposits are not at present of much value. Corundum of good quality is found within a few miles of Marshall. The village itself has only a few hundred inhabitants.

At Marshall I hired the best team that could be obtained, and a driver, to go with me to Mt. Mitchell, and parted from my companion, the mineralogist. Such a team as I secured could scarcely be found in Massachusetts, and if it could, the Society for the Prevention of Cruelty to Animals would make an example of it. All one forenoon was required to get it in order, and when in order it went about four miles an hour. A suggestion to take some ropes along for repairs was scorned by my driver, yet the harness broke four times before night. Finally I camped at night about two miles west of Asheville, beside the road. The next morning I entered the town.

The road from Warm Springs to Asheville was seriously out of repair, because of a flood which had swept down the French Broad a few months before. The rest of our route to the base of Mt. Mitchell was not so difficult as the part we had gone over.

Asheville is one of the largest towns of western North Carolina, having 1500 to 2000 inhabitants, and supporting two newspapers. The town is only about thirty miles from the top of Mt. Mitchell, yet few of its inhabitants had ever been to the summit.

That spirit of exploration, of appreciation of beauty in scenery, and of wonders in nature, and the active enthusiasm and love of travel which stimulates people in the North to form such associations as the Appalachian Club, and to explore their own vicinity, does not appear to exist in the South. Many people who have lived their whole lives within fifteen miles of Mt. Mitchell never have visited its summit, and have no desire to do so.

At Asheville, which is about two thousand feet above the level of the sea, the valley of the French Broad widens, and the town is surrounded by undulating farming land of good quality. The town itself is a very thriving one, has good

buildings, and shows evidence of business prosperity. Pretty residences with neatly kept grounds and well-repaired fences distinguish it from many southern towns of about the same size.

Just above Asheville the French Broad is joined by Swananoa Creek, a large mountain stream, beside which the road to the east goes for some distance. Up this creek the scenery is again charming, alternating outspread valleys with narrow passes, and interspersing, now and then, little waterfalls in the creek.

The vegetation along this part of the Swananoa is similar to that of any New England forest, but of a luxuriant growth. Just beyond Alexander's, a hotel twelve miles to the east of Asheville, we had to turn from the main road to the left. Soon we were in the entrance of that grand valley which extends up to the base of the highest peaks of the Black Mountains. Looking up towards its head the picture was similar to what it would be if one looked up an enlarged Tuckerman's Ravine, and the mountains about it had been clothed with trees to their very summits. The name Black Mountains was given to these peaks because of the darkness of their summits as seen from a distance, with their heavy balsam forests.

On each side of the Swananoa valley the mountains grow higher, while the creek dwindles in size as we pass by one after another of its many little feeders. In this valley rains are numerous, and I was twice wet through during the day. At night I slept in a barn. The next morning, after going about a mile further, our horse showing signs of approaching dissolution, my driver engaged a mule to carry our baggage, and a colored boy to drive the mule. Pasturing the wreck of a horse which had brought us thus far, we packed the mule and started onward. Soon we reached the last house at the base of the mountain; the summit of Mitchell's Peak was still ten miles distant. Beyond the house there is nothing but a bridle-path.

It was here that I first tried to ride a mule, and that under difficulty. The mule was not stubborn, in fact was as tractable as any animal could be, but the road was rough and often

barricaded with trunks of fallen trees over which he had to step. I have often wished for my picture as I sat on that mule. I may have looked anxious as I trusted myself to the strange beast. Behind me was a large pack, and over it extended from my shoulders a rubber blanket, for it rained now and then. In one hand I grasped a frying-pan and an umbrella, in the other the reins and a whip. A white slouched hat completed the picture.

At the base of the mountain the *Rhododendron maximum* was one of the striking features of the scenery. The large leaves of this *Rhododendron* are from eight to ten inches long, of a dark green, and hang downward around the tips of the twigs. How beautiful the trees must look when in full bloom, with their showy white flowers, for they often attain twenty feet in height!

Further up the mountain side the forest is of large trees, similar to those along the first two miles of the carriage-road from the Glen House to the summit of Mount Washington. This kind of forest extends without much change up to the crest of Black Mountain, a height of perhaps five thousand feet. Here the forest changes, and the spruces, which are found up to the summits of all the Black Mountains, suddenly appear.

Springs and running streams are not so numerous along the path as they are along the roads in the White Mountains, with which I so often compare the Black Mountains, presuming a greater familiarity with the former than with the latter.

The source of the Swananoa is near the lower part of the mountain, beside the bridle-path. We saw no more springs until we reached the Black Mountain House, several miles further on.

At this mountain house we overtook a party of ladies and gentlemen belonging to two families, by the name of Huey, from Hendersonville, N. C., a town to the south of Asheville. They were travelling with their own horses, and had hired one of the best guides to the mountain, Mr. Glass, to take their baggage on a pack-mule. Availing myself of this opportunity, I hired Mr. Glass to add my baggage to the load

of his already heavily laden mule, and dismissed my driver and his mule. The young man whom I hired at Marshall wished to see the summit; so he continued with us. The party which I joined at the Black Mountain House was made up of intelligent northern people, who had bought plantations in North Carolina since the war. Two of the ladies were interested in botany, and the rest of the trip was pleasanter on account of good company.

We lunched at the Black Mountain House, and then pushed on along the ridge, following the tortuous bridle-path amongst wet spruces and gooseberry bushes,—a queer vegetable combination,—for two and a half miles to Clingman's Peak. Hon. T. L. Clingman, a prominent North Carolinian, supposed for a time that he had discovered the highest of the Black Mountains, but afterwards Prof. Mitchell, of whom I shall have more to say later, was found to have discovered the highest peak, which all North Carolina people call Mitchell's Peak. Many of the published maps still call the highest point Clingman's Peak, although it is said that Mr. Clingman afterwards acknowledged that he was mistaken. I have adhered in my usage, as far as possible, to the names in common use in the vicinity of the mountains.

No good view can be obtained from Clingman's Peak on account of the trees, and, up to this time, the summit of Mt. Mitchell has not been in sight. Going down the bridle-path, a little to the left of the ridge which extends from Clingman's to Mitchell's Peak, the summit soon comes in view; the pole erected upon it can be indistinctly seen in the cloudy haze. It is still two and a half miles distant, miles of rough and muddy path.

We were not long in getting over the two and a half miles of mire, for we had become more reckless as our goal came in view. Climbing a little knoll we were at the summit of Mitchell's Peak, the highest point in North America east of the Mississippi River.

But how high we were I am not certain, for there are many conflicting statements concerning the height of the different mountains of this group. Dr. Mitchell first determined the height in 1835 at 6476 feet; in 1844 he obtained a result of

6672 feet. In 1855 Mr. Clingman called it 6941 feet. In 1856 Prof. Guyot determined the height to be 6760 feet; the next year he made it 6701 feet. The map compiled by the United States Coast Survey, for the use of the army during the war, gives the height as 6711 feet. It is, however, evident from the measurements of Professor Guyot in 1857, that there are twelve peaks of the Black Mountains which exceed Mount Washington in height.

At the summit a visitor's attention is first attracted to a rectangular enclosure, of about ten feet by four, surrounded by a rude stone wall about a foot high. This marks the grave of Professor Elisha Mitchell, the supposed discoverer of the peak, who died while attempting to prove that it was this peak, and no other, which he had previously visited.

Professor Mitchell was a graduate of Yale College, of the class of 1813, afterwards a tutor at Yale. Finally, in 1818, he became a professor in the University of North Carolina, at Chapel Hill. Being a great admirer of nature, and a scientific student, he visited the Black Mountain, afterwards called Mount Mitchell, in 1835, then in 1838, in 1844, and in 1856.

On the 27th of June, 1857, while attempting to descend the mountain on the north-west side, he was detained by a thunder-storm till evening, and, as he was groping his way down the mountain, he pitched headlong over a precipice of some forty feet in height, and into a pool of water at its base, where on the 8th of July he was found. He was first buried at Asheville, but on June 14, 1858, his remains were removed, and reinterred on the summit of the peak, — which was then named after him, — with impressive ceremonies, participated in by the Governor of the State, the officers and students of the State University, and a large assembly of North Carolina's most honored citizens. The land at the summit of the mountain was then presented to the trustees of the University of North Carolina. There amid the scenes he loved so well was placed all that remained of the discoverer of that noble mountain.

While I do not wish to enter into disputes concerning mountain nomenclature, I must here record my opinion that

it was this peak, the highest of the Black Mountains, and no other, which was discovered by the man whose remains were buried in so fitting a grave at its summit, a grave higher up, perhaps, than any other in the United States. My opinion that this is the peak Mitchell discovered is based on what I could learn among the mountains; from Mr. Glass, whose father helped in the search for Professor Mitchell's remains, from other guides, and from what I can find in the literature of the subject.

When we arrived at the summit it was almost evening, according to the northern use of the word; for "evening" at the South means between noon and sunset, while after sunset it is "night."

Notwithstanding the late hour, we succeeded in getting a view now and then of the surrounding mountains, for the rain, which had kept us so uncomfortable during our ascent, had now ceased. North of us extended a line of mountains almost as high as Mitchell itself. Around us, without much apparent system, were scattered peaks, all of considerable height, while far below, to the south, when the clouds broke away sufficiently, we could see the winding Swananoa, a string of pearls in the deep green forest. About us on the summit were trees and shrubs, similar in general appearance to those which one finds about half a mile below the upper limit of the trees on Mount Washington.

A few of the species of plants which I recognized as very common at the summit were *Abies Frazeri*, Frazer's spruce; *Rumex acetosella*, dock sorrel; *Oxalis acetosella*, sorrel; *Sambucus pubens*, red-berried elder; *Cuscuta rostrata*; *Houstonia serpyllifolia*, a kind of bluets; *Impatiens pallida*, touch-me-not; *Rhododendron catawbiense*, *Saxifraga leucanthemifolia*, and species of *Rubus*, *Pyrus*, *Solidago*, *Prunus*, *Aster*, mosses and grasses. Butterflies, gay Papilios among them, flitted now and then about the flowers. The climate and the surroundings at the summit of Mount Mitchell, reminded me more of a camp half-way up Mount Washington than of one at its summit.

There is a log cabin and a shelving cave within a few rods of the summit, but, disdaining such civilized accommoda-

tions, I swung my hammock between two slender trees and enjoyed a night's rest rocked by the breezes.

The next morning I spent in viewing the scenery of the mountain summit, in analyzing plants and in catching insects. At noon I started down, arriving at Mr. Glass's house at four o'clock in the afternoon. The rest of the party who preceded me had already arrived, and the gentlemen were trout-fishing in the streams near at hand. The next morning, having accepted the kind proposal to ride back to Asheville with my new friends from Hendersonville, I paid and discharged my driver, who had succeeded so poorly in his contract to get me from Marshall to the summit of Mount Mitchell.

The Huey family had a carriage and spirited horses, and we easily reached Asheville that afternoon. The next day I took the stage to Henry's Station, on the nearest railroad. Between Asheville and Henry's Station the highway passes over the Blue Ridge, at Swananoa Gap. At this gap a railroad to Asheville, finally to connect the Western North Carolina Railroad with the Cincinnati, Cumberland Gap and Charleston Railroad, is in progress, and at the crest of the Blue Ridge a temporary state-prison is located, its occupants being engaged in making a tunnel of several hundred feet in length through the top of the mountain. When this railroad is completed, it will pass through some of the finest scenery in eastern America. To the east of the ridge, where the road bed is already finished, it writhes about like a snake to gain the elevation of the tunnel.

Henry's Station is but a few miles to the east of the crest of the Blue Ridge. The village consists of a poor hotel, a railroad station, and a few liquor saloons. On account of its natural surroundings, it is a place where one who admires beautiful scenery might wish to tarry, but man has so well succeeded in making the place itself repulsive, that I was glad to get out of it.

Having thus hurried you across the mountainous region of North Carolina in the way that I was hurried across it (for I was obliged to be at Charleston, South Carolina, at a particular time), I will briefly sketch out how to get to Mount Mitchell

easily, hoping that a few, at least, of the members of the Appalachian Club may at some time profit from my hasty trip, on which I learned *how* to go to the Black Mountains.

From the east — assuming that the published railway guides give sufficient information in regard to getting to Henry's Station — the trip is short and easy. A daily stage runs from Henry's Station to Alexander's Hotel, near the place where the Swananoa Valley road leaves the main road. The entire route from Wolf Creek, on the Tennessee and North Carolina State line, to Alexander's, can be travelled by stage, and the scenery on the way is charming, but the roads are very bad, and it therefore takes longer than it does to go from the east. The expenses in going from Wolf Creek to Alexander's would be from six to ten dollars; from Henry's to Alexander's about two dollars.

The cheapest and most convenient way of getting transportation from Alexander's to the base of the mountain is to send a letter ahead to one of the guides, and have him meet you with a team at Alexander's. The cost of transportation is thus reduced to about two dollars for each person. At the base of the mountain a guide can be obtained for two days, with a horse or a mule, for packing or for riding, by paying five dollars. This gives one an opportunity to spend a night and part of the next day on the summit of Mount Mitchell.

To get to Henry's Station from Boston by rail, costs about forty dollars. The fare by rail from Boston to Wolf Creek, would be about sixty dollars.

From the above general estimates one may get an idea of the cost of going to the mountain region of Western North Carolina, a region where living is much less expensive and the climate healthier, even during the summer, than at the White Mountains.

Concerning the True Name of the Northern Kearsarge.

Statement of the Committee appointed April 11, 1877.

The Committee appointed to collect and collate the evidence presented in the discussion concerning the true name of the mountain in Carroll County, N. H., variously known as Kiarsarge, Kearsarge, Pigwacket, Pequawket, etc., having been requested to prepare a presentation of the case for the present number of APPALACHIA, beg leave to lay before its readers the following statement. They regret that they cannot present the material furnished from various sources, and especially that embodied in the extended arguments of Messrs. G. E. Emery and G. V. Fox. Inasmuch as any mere abstracts of these arguments would by no means do them justice, the Committee content themselves with merely culling therefrom the most essential portions bearing upon the immediate question, and would refer parties desiring to make a critical investigation to the papers themselves, which are on file in the hands of the Secretary of the Club.

The Committee have not interpreted the request of the Superintendent of the Coast Survey in his letter of April 21, 1876, to the President of our Club, which first drew us into this interesting investigation, as an invitation to enter upon any metaphysical discussion as to the nature of names, or the more delicate question as to the circumstances under which it is justifiable to abandon established names for the sake of securing an accurate and unambiguous nomenclature. Considering the eminently scientific character of that branch of the public service, they feel assured that they have not misinterpreted the meaning of its honored head, when he requests "such evidence as it may be in your power to give relative to the propriety of finally adopting either of these names," in construing it to be a request for the simple facts of history and usage.

The whole character of the discussion warrants the inference that all the parties thereto will be satisfied if "true name" is assumed to be synonymous with original name, so far as is upon record, handed down by unbroken and reliable tradition.

Unfortunately a secondary discussion, and one entirely remote from that before the Committee, has become implicated with this. Since there is another grand peak, in Merrimack County, popularly and historically known as Kearsarge, and since parties, repugnant for scientific reasons to the idea of there being two mountains of the very same name within the limits of the same State, have suggested the desirability of somehow avoiding this ambiguity, the entirely irrelevant question of priority of title has been raised and, by one side at least, set forth at great length.

Were the question one of simple priority, it would seem to present but little difficulty in its solution. It is incontestable that the Merrimack County mountain (U. 1.) was known by the name of Carasaga Mountain as early as the middle of the seventeenth century, as Mr. Emery shows from an ancient map of that period in the Essex Co. (Mass.) Archives. It would be an ungracious task to attempt to prove that the modern name Kearsarge is not a direct descendant from this name, which it resembles much more nearly than do many of the presumable corruptions of the same found upon eighteenth century maps.

The first mention of the Carroll County mountain (P. 1.)¹ by a similar name appears to be in 1784 — that is, about one hundred and forty years later — on a sketch-map² to be found among the "Belknap Papers" in the hands of the Massachusetts Historical Society. This map is also the first whereon this particular mountain is found designated by an individual name. Its first appearance upon a printed map is in the History of New Hampshire by Jeremy Belknap (1791), wherein both mountains are designated by the name of "Kyarsarge."

The question now arises: Is there any other name by which this mountain was known previous to 1784? Mr. Emery advances the claim that it was designated by the name "Pig-wacket" as early as 1725, and produces in evidence two journals of that year, describing two scouting expeditions under

¹ For the sake of brevity we shall use hereafter in this article the nomenclature of the Club, and speak of the mountain in Carroll County as P. 1.; of that in Merrimack County as U. 1.

² Copied, as Dr. Belknap says, "from one in Mr. Whipple's possession." The original map has not been found.

the command of Samuel Willard, which are preserved in the Mass. Archives, 38 A.

We present these quotations in full. In his first journal, under date of Saturday, July 31, is recorded: "We marched 12 miles and I with 14 men camp't on ye top of Wannadnack mountain and Discovered 26 pounds [ponds] Saw Pigwackett lying one point from sd mountain and Cusagee¹ mountain and Winnepesockey laying north East of sd Wannadnack."

In the second, under date of October 6th of the same year, we read: "We marched down ye River about 20 mile to ye place where Capt. Lovel first came upon Sawco River 2 days before his fight at ye mouth of a stream which he followed from Pigwacket Hill."

Since these two passages are the strongest evidence produced to establish a name anterior to Kyarsarge, they form the very *carroccio* of this most vigorous battle. If allowed, then this latter name, however long in usage and familiar to the most venerable people of the Saco valley, must acknowledge to have supplanted an earlier title, which renewed its claim for recognition in Carrigain's map of 1816. Failing of substantiation, there falls upon this map and its maker the onus of having, with whatever good intent, performed an arbitrary act that was destined to foster a new ambiguity, and we seem forced to acknowledge that, whencesoever it originated, the latter is, equally as in the case of U. 1., the original name,² so far as appears, of the debatable mountain.

In the first extract it is to be noticed that Willard mentions three objects visible from Wannadnack (Monadnock) mountain: Pigwackett, Cusagee mountain (Kearsarge U.), and Winnepesockey. Yet in order clearly to understand

¹ Mr. Emery reads Cusagec.

² Since there appears to be some misapprehension as to the expression "original name," we beg leave to mark the distinction between an original name *per se*, and the original name of an individual object. Thus a child might be christened John Smith. No one would argue for any originality in this title, yet arrived at maturity and having perhaps passed for a time under an *alias*, we should be justified in regarding it, as he in claiming it, as his original name. No authority, even though it had power to decree a new name, could change this immutable fact. The Committee of course do not claim any originality for the name Kyarsarge found upon P. 1. in 1784, but are weighing evidence whether or not it was the first name ever known to have been applied to it.

the passage, it must be observed that only two of these are mentioned for their own sake, namely, Pigwackett and Winnepesaukee. Cusagee mountain, comparatively near, is used with Wannadnack simply as a determinant of direction for the distant "Pigwackett." This latter, then, was seen lying one point east from a line joining Monadnock and U. 1. Winnepesaukee lies northeast.

From this passage it is manifest that Willard saw, or at least thought he saw, something lying in a definite direction, which was not only familiarly known to his party and himself as Pigwackett, but would be recognized under this appellation by those for whose benefit the journal was prepared, the members of the House of Representatives of Massachusetts Bay. The burden of proof resting on those who claim that the reference was to P. 1., they have first to show that this peak is visible from Monadnock, and then that it lies in the neighborhood of $11^{\circ}15'$ east from a line joining this latter with U. 1.

In the first citation, the omission of the important generic noun with Pigwackett and Winnepesaukee leaves us equally in doubt as to what was designated by both these titles. Since the determination of either object would create some presumption in favor of the other, the attempt has been made to show that Winnepesaukee refers to a mountain. Prof. C. H. Hitchcock says that this "is now known as Red Hill in Moultonborough, and on Jeffries' map of 1757 the name is used so as to remove all doubt that it was the hill and not the lake to which Willard referred." Jeffries' map does indeed give the name both to the lake and hills to the north of it. But Red Hill does not lie "north East of sd Wannadnack" — indeed still less to the east of North than P. 1. 1 itself. Its bearing is about $27^{\circ}6'$ east from true North. The variation of the needle in this region in 1725 was not far from 8° West. This added makes only $35^{\circ}6'$ by the needle, instead of 45° , magnetic northeast. The map referred to by Prof. Hitchcock dates thirty-two years later than Willard's journal. In the journal of Capt. Lovewell's second expedition (Mass. Archives), written only about six months earlier than Willard's, are two passages which seem to throw light

on what was meant by Winnepeseocket¹ among scouts in 1725. Under date of Jan. 5 he writes: "We travelled 8 miles towards Winnepeseocket." "Jan 9. We travelled 14 miles and encamped at the N. W. corner of Winnepeseocket." The word "corner" and the whole context seem to show that the lake is meant. Then again, in a similar journal of a scouting party under Seth Wyman, made in the same month with this of Willard (July, 1725), we find that he "Travel'd about 6 miles and came to a River about 2 miles from Winepisockee." They had travelled from Pennacook (Concord, N.H.) on the days preceding, respectively about four, eight, seven, ten, and six miles, in all making about thirty-seven miles from Concord to "Winepisockee." From Concord to Red Hill is scarcely less than forty miles in an air-line. If by reason of the distance of the lake and its setting among the hills it is impossible that the surface of the lake should have been seen, we seem forced — Willard's veracity remaining unchallenged — to one of two theories: either that something else not yet conjectured was seen, or else that Willard was in error as to what he thought he saw from said mountain top. In any event we find ourselves no farther advanced towards the true solution of the question.

In the whole discussion the Committee find that both sides have contented themselves with assertions of what must be, or arguments as to what cannot be visible from Monadnock. These being simple matters of fact, nothing that is not founded on observation under favorable circumstances can be admitted in evidence.² The absence of the unbiassed testi-

¹ The variation of the final letter is insignificant so far as the fact is concerned. As explained by Dr. Trumbull in the word *Pequawket* (see Mr. Fox's argument), the final syllable *et* makes a sort of locative case of a noun phrase.

² Recognizing the inexpediency of introducing the arguments on these points, yet desiring to present the facts themselves in the Report, the Committee, enabled by the generosity of Mr. Fox, sent Mr. Edmands as an expert to "sd Wannadnack" to determine as to the visibility of all the points in question, and furnish a profile made with the topographical camera, to accompany the Report. The former President of the Club and a member of the Committee accompanied him. They remained three days, but unfavorable weather, with no prospect of change for the better, interfered with the success of the expedition, and, adding the pressing claims of APPALACHIA, rendered it inexpedient to remain longer.

In the absence of the testimony of an expert, we present the following quotation from a letter from Rev. G. M. Rice, of Dublin, N. H., situated at the foot of Monadnock,

mony of eye-witnesses has appeared to them a serious defect in the conduct of the argument. They assume no absolute assurance upon the point of visibility. So far as the angular distance of P. 1. from the line Monadnock — U. 1. is concerned, the figures of the Coast Survey ($11^{\circ}2'$) confirm it into $13'$ or about $\frac{1}{3}$ of a point, which is practically absolute. Such accuracy is, of course, simply a happy coincidence.

The opponents of the name Pequawket can well afford to admit the point of visibility from Monadnock, for before the arguments of the other side could be held conclusive, it would be necessary to prove that this mountain is the *only* geographical feature visible and bearing in the given direction to which the name "Pigwackett" could have been applied.

But the mountain itself is upon the northwesterly confines of an indefinite region (from which indeed its assumed name is taken), the country about the Indian village of Pigwacket. Though P. 1. 1, and this only, may have been what he saw, nevertheless Willard may not have meant in his report to the House of Representatives to designate this mountain by name, thereby speaking of it by a familiar and recognized title belonging to it. The point taken is best shown by an illustration. A person journeying towards the capital of Massachusetts might from a distant point obtain a view of the dome of the State House. Speaking with an ordinary license, he would be justified in saying that he saw Boston lying in a certain direction. They would not hold a scout with his compass to the accuracy of a topographer with his theodolite, yet in reply to the argument that one point is definite and seems more applicable to a mountain peak than an extended region, they submit the fact, that, allowing the Pigwacket region liberal limits (from Mote Mt. to the eastern side of the great oxbow of the Saco), it subtends upon the

in reply to one of inquiry from the Committee. "*Lake W. cannot be seen from Monadnock, I think, and it is doubtful if Red Hill can be distinguished. Kearsarge can be unmistakably. One person of whom I inquired thought that Red Hill could be seen, but was very certain the Lake could not.*" The italics are his.

Prof. Hitchcock testifies to having, in company with several others, recognized Monadnock from P. 1. 1 on July 27, 1876. He also recognized P. 1. 1 and Monadnock from Red Hill, July 5, 1877. Mr. Emery claims to have "positive knowledge that Pequawket and Kearsarge are visible from Monadnock."

map an angle from Monadnock of about 8° , whose mean is but 2° , less than one-fifth of a point, to the east of the signal on P. 1.

Allowing then that P. 1. is visible, it might have stood for Willard either in its character of a mountain, or as part taken for the whole of a region. To either of these the name might have been applied. That it was then applied to the mountain, the advocates of the name Pequawket furnish only these passages in evidence. The history of the times seems full of evidence that the region of which the Indian village was, so to speak, the centre, was in common parlance called by this name.

It is a fair assumption that Willard, in making his Report to the body to which he was responsible, would have used only such geographical terms as would be familiar to that body. It is incontrovertible that the term Pigwacket — applied not merely to the circumscribed space occupied by the lodges of a few hundred Indians, but to an indefinite extent of country in its vicinity — was very familiar to the people of the colony three months after Lovewell's famous fight with the Sokokis Indians. Of this valiant struggle it has been said that "no event from that time to the Revolution had taken so strong a hold on the feelings of the people."¹ It was the goal of this very scouting party of Samuel Willard, as it was of others before and after.

Are we then to infer that P. 1. was also familiarly known as "Pigwackett" at the same time? If it were so, then Willard must have laid himself open to the charge of ambiguity, if indeed his use of the name would not seem to imply a greater familiarity on their part with the mountain than with the region. What could have given it such a prominence that its name should have been familiar, when not another of the army of New Hampshire mountains beyond the Saco is known to have received a distinctive title until a half century later?

Passing on to the second extract: "We marched down ye River about 20 mile to ye place where Capt. Lovel first came upon Sawco River 2 days before his fight at ye mouth of a stream which he followed from Pigwacket Hill."

¹ F. Kidder. Preface to the Expeditions of Capt. Lovewell.

In this, as in the former citation, the absence of all punctuation may lead to serious misconception. The passage is open to two interpretations. In accordance with the one, Capt. Lovel first came upon Saco River at the mouth of a stream which he followed from "Pigwacket Hill." In accordance with the other, his fight occurred at the mouth of a stream which he followed from "Pigwacket Hill." Mr. Emery, who sets the passage in evidence, and to whom it seems of especial value as confirming the preceding one, offers the former interpretation. He then assumes that the stream was what is now known as Artist's Brook which flows from P. 1.; hence that P. 1. and "Pigwacket Hill" are identical.

The Committee fail to find that any evidence is adduced to support this claim. On the contrary they find that the claim is in direct contradiction of fact. How is it possible that Lovewell marching up from the south—from Dunstable by way of Ossipee—should *first* come upon Saco River by following down a stream which flows from the north?—Whatever the stream might be, it could not empty into the Saco River from that side. By this interpretation it would be clearly established that the "Pigwacket Hill" of Saml. Willard was on the south or southwest side of the river, and hence could not be P. 1.

Mr. Fox, adopting the other interpretation, claims that the stream at the mouth of which the fight occurred was Lovewell's Brook, which Capt. Lovewell followed from Stark's Hill in Fryeburg, Me.; hence that this is Willard's "Pigwacket Hill." He quotes from Williamson's History of Maine (Vol. II. p. 135). The historian in describing Lovewell's march speaks of his band as "leaving the Pigwackett Village between one and two miles north of them, and pursuing down on the north side of Lovewell's, or Mill Brook, nearly to its mouth, and then in a direct course to the western corner of the pond."

The objections raised against this by the opposite side do not hold good, since they are objections only when the interpretation assumed by that side is insisted upon. They are that Lovewell's Brook does not empty into Saco River, but

into what was then called "Saco Pond," and hence its mouth could not be the point where "Capt. Lovel first came upon Sawco River;" and again, by the record, Lovewell's party did not reach the pond until one day before the engagement, while the journal speaks of "2 days before his fight . . ."

A valid objection, nevertheless, to this latter rendering, is, that while the fight occurred on the edge of Saco Pond, the actual battle-ground is situated from quarter to half a mile beyond the mouth of Lovewell's Brook.

But Mr. Fox adduces the following confirmatory evidence: In 1740 Walter Bryant, a surveyor, was employed to run the boundary line between New Hampshire and the County of York (western part of Maine). He is expressly instructed by Gov. Belcher as follows: "Take particular notice of all hills, mountains . . . that shall lie in your way, and remark the same in the plan of your survey." In his journal he records a meeting with two Indians, and says: "They . . . gave me an account of Ossipa Pond and river, as also of a place called Pigwacket; they told me to know when I was at Pigwacket was by observing a certain river which had three large hills on the S. W. side of it, which narrative of said Indians respecting Ossipa, etc., I found to correspond pretty well with my observations." On the plan of his survey, which is preserved in the Mass. Archives (Col. Book 5, page 2) "at a short distance east of the point where the boundary line crosses the Saco, he has distinctly marked three hills, plainly inscribed 'Pigwacket Hills'" — in Maine, on the opposite side of the Saco from P. 1. 1, and some eight to ten miles distant from it, in the position of what are now called Stark, Long and Bald Hills.

In considering the evidence, it became the duty of the Committee to make a thorough examination of this second journal of Saml. Willard. It has been supposed that his scouting party followed up the East Branch and found their way over Mt. Willard into the Saco valley. By following their course as nearly as is possible step by step, and making the necessary allowance for overstatement of distances, it will be found that he turned east from the Pemigewasset before reaching the East Branch, passed probably over the

Osceola range, and over the height of land somewhere between Hancock and Kancamagus, and finally struck the head waters of Swift River, which he calls Sawco River. Upon no other hypothesis is his journal, from the time he finds the supposed head waters of the Saco, explicable. By this it is lucid.¹ This being so, the "Sawco River" of our second quotation is the Swift River, and the point where Lovel first comes upon it is in the immediate neighborhood, and apparently just west, of where it joins the true Saco River, which seems indeed to flow into it as a N. W. branch. That Swift River was, even in the last half of the seventeenth century, considered the main stream of the Saco, is clearly indicated in Jeffries' Map of New Hampshire (1775).

Now, since "Pigwackett Hills" are found located in Fryeburg in 1741, and since Lovewell, marching up from the south could not *first* have arrived at Saco River by following down a stream from any Pigwacket Hill thus far conjectured, it seems to the Committee, while they recognize the validity of the objection already cited, that the second interpretation is the more natural and more consonant with the known facts of contemporary history. — No one maintains, by the way, that either of these hills is visible from Monadnock.

It thus appears that while probabilities amounting almost to moral certainty point to U. 1. as the prior possessor of the name Kyarsarge,² quite strong probabilities indicate for Stark's Hill a prior designation by the name Pigwacket.

Mr. Emery, employing Bryant's journal to show that the name Pigwacket was applied to an extensive region, takes

¹ The presumptive course from the Pemigewasset to where Lovel first came upon Saco River is indicated on the map at the end of this number. No degree of accuracy is claimed for it except from where its course trends southeast to the head of the Hancock Branch, which, as it appears, they call "Merimack," and which runs "from ye S E around said mountain." Willard's estimates of distance are so wild that little reliance can be placed on them.

² Prof. Hitchcock and Dr. Bouton advance the theory that the name was transferred from U. 1. by the first settlers of the Pigwacket country, who emigrated thither from Merrimack County. Mr. Emery states that a family tradition credits Dr. Emery, a brother of his great-grandfather and the first physician of Fryeburg, with having bestowed the name "from its resemblance to the real Kearsarge with which he was very familiar, from previous visits to a brother who lived at Andover within the afternoon shadow of said Kearsarge." The internal evidence of transference is exceedingly strong.

issue with Mr. Fox in the result at which he arrives. Objecting to the term "large" applied to hills of no greater magnitude than those just mentioned, when the word "hill" was in those days applied to Mts. Washington and Lafayette themselves, he argues that the three large hills must have been Mote, Chocorua and Passaconnaway Mts. It would hardly seem plausible, whatever might be thought of Mote and Chocorua as landmarks for the Pigwacket country, that Passaconnaway in the Swift River valley, some fifteen miles away and hidden by the Mote Range, should be chosen for such a purpose. As he makes no mention of the plan with the three hills marked upon it, we infer that he had not seen it. In another place in his journal, Monday the 23d, Bryant speaks of passing "over five large mountains," and these also are duly marked in his plan. The application of the phrase "large mountains" to highlands on the New Hampshire boundary line below the Saco (none probably over 2000 feet high) would seem to forestall any objection to speaking of the eminences in Fryeburg as "large hills."

Such is the evidence which the Committee has sought to present with due impartiality, yet setting all in the strongest lights, on which it is sought to establish that the name "Pigwackett" was applied to P. 1. 1 as early as 1725. The shades of probability which it will assume may still vary with individual minds, but the facts seem to afford but insecure foundation for a stable conviction.

It is interesting to note that the first time the title "Pigwacket" appears upon any map as applied to high land is upon this plan of Bryant's survey in 1741. On Mitchell and Hazzen's map of 1756 is also a group of "Pigwackett Hills," three of which are in Maine, and all upon the opposite side of the Saco to P. 1.

Mr. Emery cites these and three later maps on which "Pigwackett Hills" appear. In no case does he locate them so as necessarily to include P. 1. 1, or state anything that would militate against the inference that, in the other three maps, they are the hills so called by Bryant, and Mitchell and Hazzen, handed down from one to another, as the name Pequawket has been in more recent times. The preservation

of one style of orthography in a word so variously spelled certainly strengthens this inference.

Not until 1816, so far as appears, is this name found attached to P. 1. 1 upon any map or chart. Here this peak is designated as "Pigwacket Mt., formerly Kiarsarge." A remarkable vagueness of opinion is generally manifest as to the nature of the change thus attempted by Philip Carrigain. It is assumed by some, as Dr. N. Bouton of Concord, N. H., the well known historical scholar and writer, that Carrigain simply asserted the claim of an older title, "thus correcting what he considered an error of Dr. Belknap, in calling the mountain by the latter name" — that is, Kiarsarge — and gave to the mountain "its just and appropriate name 'Pigwacket.'" This assumption manifestly rests on no basis other than what presumption of a previous name has been called into being by the Willard journals. Carrigain himself laid no claim to making such a restoration. His very use of the expression "Pigwacket Mt., formerly Kiarsarge," is more than a tacit acknowledgment of the priority of the latter. In view of the fact that he adds the explanation "formerly Kiarsarge," he seems to assume the responsibility for an arbitrary change. This is the more markedly true from the fact that upon the original plans (produced by Mr. Fox) furnished to Carrigain by the townships of Chatham and Bartlett, in accordance with an act of the Legislature, to serve as data for his authorized map, we find no suggestion of any change. On that from Chatham the mountain is designated "Keiersearge;" on that from Bartlett, "Keresarge."

So far as the continuity of tradition is concerned, though it has been shown that the name Pigwacket, in one form or another, has persisted coördinately with the other name since 1816 (though to but slight extent in local usage), nothing has been brought forward to shake the testimony, produced in the form of affidavits and supported by the confirmation of numerous maps that the name Kyarsarge, in one form or another, has been continuously handed down and in general local usage since 1784.

It has been maintained that, inasmuch as the Legislature of New Hampshire had by its enactments caused Carrigain's

elaborate map to be constructed, and voted to send a copy of the same to the President of the United States, to the authorities of the several States, and others, it thereby "adopted and published Pigwacket" as the name of P. 1. 1, and that "the name becomes an official designation;" also that "until altered or amended by the proper State authority the name Pigwacket or Pequawket should remain applied where it is."

The Committee doubt the legitimacy of the inference that such an adoption of a map places the great seal of the State upon every particular contained in the map. Such official recognition of topographical and other errors incident to all maps does not appear to be regarded as having any binding force. Errors appear in this very map that have been corrected in subsequent maps, notably that concerning the limits of Merrimack and Pemigewassett Rivers.¹ If the point be well taken, it still appears that the Legislature of New Hampshire on July 14, 1864, passed an act chartering a road "from Kearsarge Village in Carroll Co., to the top of Kearsarge Mt.," and by this particular act may be held to have altered or amended all previous enactments so far as they seem to affect the name of the mountain.

Any distinction between the two mountains founded upon a difference of spelling seems to the Committee unsatisfactory in itself, and as having no basis in settled tradition. Kearsarge and Kearsarge are but two among a multitude of orthographic variations, and there are various ways of pronouncing either in vogue among the inhabitants of the two localities.² Since on the map of 1791 both are marked "Kyarsarge" and since to-day both are spelled Kearsarge — even though the spelling Kearsarge is sometimes applied to P. 1. and never to U. 1. — we have every reason to believe that the name is but one under two manifestations. As a matter of general interest, however, we record the fact that, as far as appears from the various authorities cited by the disputants, the spelling Kearsarge for P. 1. has a priority over the same spelling

¹ See APPALACHIA, I. (p. 29), Mr. Warren Upham's paper on "The East Branch of the Pemigewasset."

² It is claimed by Prof. Hitchcock that "till the sloop of war controversy arose everybody said Kearsarge for P. 1. 1."

in the case of U. 1. For the former, it first appears in the proprietors' plan of the town of Chatham, dated Oct. 24, 1792; for the latter, in the laws of New Hampshire 1804, although in Howe's Courier of New Hampshire, 1799, the name of U. 1. is spelled Keasarge — without the first *r*. The tract of land lying partly upon this mountain is called "Kearsarge Gore" in 1793.

The Committee then find that there are two mountains in New Hampshire which at present bear the same name, Kearsarge; that so far as they are able to judge, the name is equally the original name of both, and handed down by unbroken and reliable tradition; that another name, Pigwacket, with several variations of orthography — an appellation which, as it appears, was formerly applied to a group of hills some miles to the South East — has also been quite frequently applied to the Carroll County mountain since 1816, sometimes alone, but often joined with the other title, and more especially upon maps that are recognized as good authorities, and in gazetteers, and in virtue of this must be considered *a* name for the same, although the other seems to have over it the advantages of priority and especially of general local usage.

CHARLES E. FAY,
W. G. NOWELL,
JOHN WORCESTER,
Committee.

Portable Instruments.

By W. H. PICKERING.

In the following list, I have endeavored to include all the instruments which would come strictly within the limits of my subject. They may all be carried in the coat-pocket; and are, with one or two exceptions, inexpensive. The observations made with them require no previous practice, and will be found of great convenience to the owner, should he return over the same route, as well as to other members of the Club who may afterwards travel the same way.

(1) The Watch. One of the most useful instruments for purposes of exploration, it will be found, is a silver watch in

a hunter's case. The time taken for a walk, deducting rests, gives a nearer approximation to the amount of fatigue endured than the observations of any other instrument. And indeed a very fair exploration may be conducted with a watch alone.

(2) Pedometer. The construction of this instrument is simple, it never gets out of order, and never needs winding up, going only when it is carried. After purchasing one, the owner must regulate it according to his own step by walking with it, at his natural pace, a measured distance obtained from a map or otherwise. The regulating is readily effected by turning a small screw at the back. On level ground it gives very fair results. On a mountain one should subtract thirty per cent. The accuracy is then about as great as that obtained from a good map, when one knows the precise course followed. The distance marked by it in ascending and descending is almost precisely the same; and it is of great assistance in describing any place, as a spring or a turning in the road, to a friend who also carries one, or in remembering it oneself, to say it is just such a distance from such a place, instead of giving a long description of the surroundings. Whether the pedometer marks the real distance on the mountain, or merely some arbitrary amount, will make no difference, as the other pedometer will do the same, if both are properly regulated. As far as the graduation is concerned, I prefer the French system to the English, as it is much more convenient in taking notes, and also in subtracting one number from another, which one has constantly to do in using the instrument. On level ground it will give the time consumed in walking almost as accurately as a watch. In fact this is one of the objections to the instrument, as it will mark the twentieth mile three or four hundred feet longer than the first. The cost is fifteen dollars.

(3) Barometer. Of these instruments the mercurial is the most accurate form. But owing to its inconvenient shape and weight, it has been almost wholly superseded for explorations by the aneroid. A good aneroid may be purchased for about forty dollars. They are very convenient on a walk for informing one how much he is below the summit of a mountain, or how much more he must descend before reach-

ing the foot. Before recording a reading, the instrument should always be tapped on the side, as the pointer is then more likely to move to the proper place. Observations should be taken both on arriving at, and on leaving the summit, and the observer must not be surprised if he sometimes finds that the mountain has risen fifty feet or more while he has been on it. This is not uncommon, owing to the time required for the vacuum box to attain its proper size. Hence the second reading is generally more correct than the first.

(4) The Compass. One of these may be obtained for twenty-five cents which will point north, but to be of use in exploration a compass should have the degrees marked on it. A good one may be had for from two to five dollars.

(5) Inclinator. This instrument is used in measuring slopes, and costs two dollars. It cannot get out of order and gives very accurate results, so that it can even be used to measure the angular altitude of near objects — rocks, steeples, etc., giving them within a probable error of half a degree. With it one can also obtain the average slope of distant mountains seen in profile. I think a very interesting series of observations might be thus obtained. A striking instance of this is the slope of Mt. Lowell into Carrigain Notch, as seen from Chocorua, where the whole slope has an average inclination of 40° . On most mountains the slope is about 20° . In obtaining the average slope of a portion of a path, the best way is to lay down a walking-stick, and place the instrument on that.

(6) The Lock Level. This instrument is used to determine what points have the same apparent elevation as the observer, who stands on the side of a mountain, and by going up or down obtains the elevation of all the mountains in sight lower than the one he is on, and also those which are higher, provided they are at a sufficient distance. The instrument can be used only in connection with a barometer. Its cost is ten dollars. The observations obtained cannot be directly used, but must be increased owing to the curvature of the earth, by adding to the results the numbers obtained by the formula $h = \frac{1}{2} d^2$, where h = feet of altitude and d = miles.¹

¹ A somewhat simpler form of the other formula which I gave in the last APPALACHIA is $d = \frac{4}{3} \sqrt{h}$.

Thus if the observations indicate an elevation of 4200 feet, and the mountain is twenty-three miles distant, the real elevation will be 4500 feet.

(7) Pocket Sextant. This is a very convenient little instrument, and is the only one I know of for surveying purposes which may be called a strictly pocket instrument. It is about two inches thick and three inches in diameter. Price about fifty dollars. It may be used to measure horizontal angles within a probable error of 2'. They have however to be reduced in case one of the points has a greater apparent elevation than the other, as the angle measured is the real angular distance between the points, and not the horizontal angular distance.

(8) The Thermometer. The mean annual temperature of any place, as the top of a mountain, may be approximately determined by ascertaining the temperature of the springs in the immediate vicinity. For this purpose the deepest portion of the spring should be chosen, and the thermometer well sheltered from the sun. The temperature of the air should also be observed in the shade, taking care to first wipe the bulb perfectly dry.

Inclinometers and cheap compasses may be had of A. J. Wilkinson & Co., 184 Washington St. More expensive compasses and the other instruments can be bought of Thomas Hall, 19 Bromfield St.

The Topographical Camera.

BY J. RAYNER EDMANDS.

Presented June 18, 1877.

This instrument is designed to draw mountain profiles accurately to scale, and to enable one to determine the horizontal and vertical positions of surrounding objects, by tracing the image in a dark chamber.

The principle of the camera obscura is quite old, but new methods have been used to adapt it to the purpose. The paper surface, upon which the drawing is made, is a portion

of a vertical cylinder whose axis passes through the lens; it is mounted on a frame supported by a short tripod, so as to be opposite the eye of the operator seated on the ground; and a canopy covers the whole in such manner, that the greater part of the light entering is what proceeds from the surrounding objects, through the lens, to form the image on the paper.

The new features of the optical arrangement are thus described in APPALACHIA, No. 1: "The lens is mounted so as to turn about a vertical axis which passes through its centre and coincides with the axis of the cylinder. Only a portion of the view is seen with any one position of the lens; and the 'field,' or imaginary surface upon which the rays come to a focus, intersects the paper, lying part before and part behind it. Hence the lens may be so turned as just to focus that particular part which it is desired to draw at the moment. It is important to notice that rays of light proceeding from any point converge after refraction upon the continuation of the right line drawn from the point to the centre of the lens, whatever be the position of the lens. Therefore the operation of focussing by rotating the lens does not alter the position of the image upon the paper, as would be done with the ordinary way of sliding the lens back and forth. We are also thus able to cover a wide field in the aggregate without using pencils of light which pass the lens at any considerable obliquity to its axis;—a great advantage, since these oblique pencils never come to a satisfactory focus, as has been shown by Prof. Pickering and Dr. Williams." By "centre of the lens" is here to be understood the point from which the axes of pencils of light, actually passing the optical centre, virtually diverge after refraction by the posterior surface. Its position in a glass lens is at nearly one-third the distance from the optical centre to the posterior surface.

The various parts of the instrument as now arranged, are:—The star, or tripod-head, composed of six cross-bars of wood. The tripod, also of wood. The drum, composed of two segments of wood carrying the brass sheet and the paper. The objective, consisting of the lens with its metal mounting. The canopy, of woollen and India-rubber.

The cross bars, of black walnut, are all alike, with the ex-

ception that half of them carry maple blocks differently disposed from those on the other half; the respective distances between bearing surfaces are so carefully equated, that the bars may be put together in any order preserving the alternations in kind; while screws at the points, and wedges at the intersection press the bearing surfaces firmly together. The screws are of box-wood, turned for the purpose, fitting holes tapped in the maple blocks; and studs projecting from the milled heads of the screws serve to connect the frame and the tripod.

The tripod is of ash and cherry with brass rods to fasten each part in position. The three parts are interchangeable, and each folds to half its length. Each foot carries a box-wood levelling-screw and binding-nut. The numerous joints are securely glued and riveted or screwed.

The segments, of black walnut, are carefully cut to the required arc (radius = 573 mm.), and carry pins projecting from the periphery. The brass sheet has slots along its edges corresponding to these pins, the immediate vicinity being stiffened by an extra thickness of metal. The sheet is made tight upon the segments by wedges, the driving of which also serves to keep the paper in place against the brass. The inner surface of one of the segments bears radial marks and notches every 5°, and these graduations are transferred to the paper in order to avoid error from unequal stretching of paper or from changes due to moisture. The upper segment is attached to the under side of the star by screws working in slots cut in brass plates. These slots are so curved and adjusted that the drum may be moved through a short arc about the axis of the cylinder. To avoid trouble from warping of the segments, cleats are fixed to the upper surface to bear against the under surface of the star. The surfaces of these cleats may be trued up at any time. The screw-holes and nuts in the star are very carefully placed, so that the drum may be fixed with its axis in either one of six positions; and each segment carries the cleats and brass plates necessary for the upper one.

Much time was spent in securing the lens. Bi-convex spectacle glasses of an inch and three-eighths available aper-

ture, and twenty-two inches nominal focal length, may be found in the market; and these vary sufficiently to enable one to select a glass which can be used for an instrument, the scale of whose drawing is three-eighths of an inch to the degree. But an aperture of five or six centimetres (two inches or over) is desirable to increase the illumination, and the scale recommended for profiles is one centimetre to the degree. Moreover, a plano-convex lens has less spherical aberration, while one can predicate of it the proper distance of the axis of rotation behind the optical centre, without elaborate demonstration or careful experiment. The difficulty was to grind a lens, conforming within a few millimetres to a specified focal length; an undertaking which was repeatedly declined until Messrs. Alvan Clark & Sons of Cambridge were applied to. It will be noticed that the required distance of the paper from the lens is determined by the scale upon which the drawing is to be made, so that the only accommodation in focal length is that due to the acuteness of the pencils, together with such as arises from the fact, that oblique pencils are brought to a focus earlier than those which pass axially through the lens. This also enables objects near the top or bottom of the field to be focussed, in spite of the increased length of the hypotenuse.

The tube in which the lens is mounted is as short as possible, the design being to make screening tubes, diaphragms, etc., of cardboard to avoid extra weight. The motion about the vertical axis is without play, the *constant* position of the virtual centre of the lens during the drawing being more important than its exact location in the axis of the cylinder. But the latter point is attained as near as possible by using the screw merely to bind the parts, while shoulders determine the precise position of the objective upon the star. This position is near the vertex of either exterior reëntrant angle and twenty-five centimetres (somewhat less than ten inches) from the centre of the star. There are two heights at which the objective may be fixed. One places the horizon about midway the whole height of the paper, while the other places it near the middle of the upper half. With the latter position one may make two drawings upon the same sheet by turning the drum over for the second drawing.

The canopy is composed mainly of repellent cloth; but a rubber blanket will serve for part of the canopy, as well as a shield to the instrument during rain, and a protection to the explorer if overtaken by night.

The points aimed at in designing the parts are accuracy of adjustment and stiffness when set up, compactness when dismounted, and lightness. The device of forming the tripod-head by disposing intersecting bars along planes joining the alternate edges of a regular hexagonal prism is believed to be an especially good method of securing these various advantages at once. The wide spread at the top of each member of the tripod is also conducive to stiffness. The length of the bundle, prepared for carrying, is two-thirds of a metre (about $26\frac{1}{4}$ in.). For carrying short distances, however, the star need not be taken to pieces. Mounted, we have a six-sided star 77 c.m. (30.3 inches) between opposite points, supported in a horizontal position nearly a metre (or yard) from the ground by a tripod fastened to the six points, thus leaving the intervening space free for the occupation of the operator. Having thus set up the frame, successive drawings may be taken by fixing the objective and drum in one position after another without altering the original setting of the frame, except possibly to rectify the levelling. The ability to orient is useful for resetting unfinished drawings, or for solving certain problems which depend upon superposing two drawings upon the same paper. A single drawing covers about 70° horizontally upon a scale of 1 c.m. = 1° . The depth of the paper is nearly 18 c.m. (about 7 inches) in the clear, so that an imperial sheet will furnish three strips.

A pocket level is carried with the instrument. By placing this upon the cross-bars of the star the frame is brought as near level as convenient, then the canopy is put on; and the final adjustment is effected with the level resting upon the lower segment. Then if a line be ruled upon the paper along the edge of the lower segment, we may assert that the horizon of the instrument will be everywhere equidistant from it, provided the segment be not warped. It is not the purpose of this paper to discuss the effect and method of eliminating the error due to warping of the segment, nor to consider other

points in regard to using the finished drawings. It is necessary to remark, however, that in order to tell the exact position of the horizon upon the paper, one must obtain the angle of elevation or depression of at least one point in the view by means of an independent observation or calculation. The distance and elevation of the point with reference to the station occupied are the elements necessary for the calculation. For some purposes it is not necessary to know the position of the horizon with the greatest accuracy, provided its direction on the paper be well known. In such cases its position may be roughly found by noting the elevation of the centre of the lens above the edge of the lower segment.

A deflecting prism has been designed, to be placed in front of the lens. The light enters the prism sensibly without refraction, suffers two internal reflections and emerges also without sensible refraction. So long as the reflecting planes are vertical the whole view is deflected through a constant horizontal angle equal to twice that between the planes. The prism may therefore rotate with the lens about a vertical axis without thereby varying the angle of deflection. By superposing upon the same sheet of paper the salient points of the direct view and also of the adjacent sextants to the right and left, we have a very accurate means of joining the separate full profiles. The angle of deflection need not be exactly 60° provided its precise value be determined.

By leaving off the canopy, objective and drum, and setting up the star with the flush side uppermost, we have a plane table of considerable size. Heavy Manilla paper should be used for the plane table sheet, and where it is desired to erect a needle a cork may be attached to the under side with a wafer. By providing the alidade with a micrometer screw or other means of accurately reading vertical angles near the horizon, one may take the necessary observations for locating horizons upon the camera drawings, without depending upon calculations.

For the profiles, heavy Manilla paper, although clumsy to handle, is probably the most accurate where everything is easily seen; but for the best definition of difficult objects a smooth, white, unsized surface is the best. Light Manilla has no advantage except its cheapness.

To consider the many purposes which drawings with the topographical camera will serve would carry us beyond limits. Subsequent communications on the subject, if appearing elsewhere, will be noticed in future numbers of APPALACHIA.

The Mt. Adams Paths.

BY W. G. NOWELL.

Read Dec. 12, 1876.

It remains to speak briefly of the work of the Club in this department as tested. In doing so, I must confine myself mainly to Mt. Adams, merely making mention of the convenience afforded the topographical and art departments by the clearing on Boy Mt.

Go up Lowe's Path with me, and let me tell you on the way of some of the advantages gained by its construction, and how they have been appreciated this first summer of the Club.

In front of the pleasant cottage at Brookvale, eight and a half miles from Jefferson Hill and from Gorham, and ten and a half from the Glen House, we leave the hilly Randolph road, cross fifty metres of meadow, run over the rocky-bedded Moose, here three to five metres wide, on a section of the trunk of a sturdy old hemlock now fallen and bleached to silvery whiteness; then, with easy tread on the soft forest-mould, pass, with the curious eyes of new-comers, through seven hundred metres of mixed growth, chiefly rock maple, beech, yellow birch, hemlock, white and black spruce, white and black ash, with here and there a tall fir, and around the clearing, a hundred and fifty metres broad, which we traverse midway this length of the path, a few large-leaved basswoods and slender cherries. The undergrowth on either hand is light and open, mountain maple, aspen, rowan, witch-hazel, hoary alder (overarching the lower moosewood and mountain alder), the handsome yew, and the provoking hobble-bush.

We began our ascent at an elevation of 425 metres above mean-tide level, 75 metres below the level of the Mt. Adams

House and 10 metres below that of the Waumbek. We shall pass the level of the former hotel when we have travelled 750 metres from the Moose; we rose above the level of the latter 150 metres from that stream.

The grades thus far (to 0^k.7) are low, averaging only 1 in 11.3. They now suddenly increase, and for two kilometres average 1 in 7.1, the highest grades being in the first and the last five hundreds of these two thousand metres (0^k.7 — 2^k.7). Near the beginning of the last five hundred we cast a regretful look into the entrance (elevation 790 metres) of the new path to King's Ravine that branches off to our left between 2^k.2 and 2^k.3; but we resolutely forego the impressions which we know we should receive in the heart of the great high-walled mountain hollow into whose depths it would lead us, until we have climbed by the main path to the very crown of the monarch up over whose broadest and strongest shoulder our steps are now bearing us.

We have passed, since the Moose, several streams of water, all tiny tributaries of that river and all good to drink of, the coldest appearing as a spring under a log directly in the path (between 2^k.5 and 2^k.6), and the next as a bright brook running across the path near 2^k. Most of them flow off to our right, and take the easterly course of the Moose only when they have run down near the lower edge of the woods; for we are on the western slope of a northern spur; our path runs nearly parallel with its crest, and 20 to 30 metres vertically and 150 to 200 metres in slope distance below it.

The forest growth within the first two kilometres was as fine as any we ever saw. When we come down in the dim gloaming light of the late afternoon, the broad avenue brown with fallen leaves or sprinkled with the delicate green of ferns and flowering plants of the woods, and shadowed by interlacing boughs of sturdy maples, and vaguely-wandering branches of birch and beech, and graceful sprays of airy hemlock — all shot through with towering stately fir and spruce — will stretch away before the footsteps of those who are unwillingly homeward bound, enchantingly.

At 2^k.7 we are at the foot of a sharp-faced bluff. Within the last kilometre the hard wood has been disappearing; with

it, the "saple" and bear traps; and after we have climbed 350 metres through the new growth of small birch (forty years old) which clings to the next steep grade (averaging 1 in 2, and between 2^k.8 and 2^k.9, 1 in 1.6), and have passed, at 3^k.05, the A. M. C. Camp (see APPALACHIA, Vol. I. No. 2, p. 116) and its tiny cascade, we enter an open forest, mostly of fir, which finds but scanty support from the thinly covered boulders and ledge of the next 700 metres, and stretches out its dead branches over shaggy ferns and mossy fallen trunks and huge rocks, in such a weird uncanny fashion that we did not wonder that the first lady who climbed up through the steep tract, called it Hades, seeing it as she did under a lowering sky, and while the gray light of early morn was yet struggling over the mountain ridge to this chill northern slope. Its aspect is never quite natural; it is always wild and strong, as might befit the abode of giant forest-ghouls. The rocks, piled in wild confusion and here and there shown bare, are enormous; the crevices between are deep and suggestive of greater depth. The sunlight shines here with a yellow hue. All the colors are pale; the broad carpetings of delicate wood-sorrel are pale; the tall mountain golden-rod and lettuce wave pale wands. The wind finds no living lower branches to lift and sway; it can only swirl, above around stiff unyielding tops of tufty fir, and below among gray, massive, moss-grown, fern-fringed boulders. There is ever here a fascinating shadowiness, which at dawn or in storm deepens into gloom and a suggestion of dread, vivid enough if you come suddenly in a misty air upon the branchless and leafless trunk of one of the tall white canoe birches scattered through this mysterious region, which might well personate a ghostly inhabitant thereof.

This whole tract is so steep that one going up must stretch and coming down may leap, to make each step arch a stair. Between 3^k.6 and 3^k.7 the grade averages 1 in 1.8, and is exceeded in but two places along the path, one 200 metres below the A. M. C. Camp, and the other between 4^k.6 and 4^k.7, at each of which the grade averages 1 in 1.6 for a hundred metres.

As we still press onward and upward, the forest dwindles

fast, our vertical ascent is so rapid. We curve to the right around the head of a bold rocky bluff, and are passing along its side when our leader suddenly calls out, "Three k. eight!" and in a moment the whole northern and western landscape bursts upon our view, sending back in richest tints of green the glare of the bright morning sun shining behind us. We already overlook Mt. Starr King, and only the distant blue of Mt. Lafayette reminds us of greater heights.

We eagerly pass through a bower of low trees, delicious with the fragrance of Balsam Fir, the Creeping Snowberry, and the Lesser Pyrola, and climbing from its upper outlet to the further of two rocks marked A. M. C., and arrowed (at 3^k.92, designated .4r on the map), we here, at an elevation of 1325 metres, command the horizon from the west crest of Adams, southward by the peak of Jefferson, west, north, to the mountains east of Shelburne. Storm or lack of strength may sometimes prevent the tourist from gaining the grander views from higher points. If so, he will feel repaid for his ascent thus far, as he studies the massive structure of the mountain whose summit he may not reach; the sharp scarred slopes of the Castellated Ridge and its picturesque battlements, the glimpse of the Fabyan plain over its lower extremity, and the successive series of firm blue mountain-walls that rise beyond, backed by the serrated edge of the highest Franconia; or lets his eye wander down the broadening valley of the Israel, dotted with farms and villages and bits of bright water; or roams in imagination over the billowy mountain-sea that rolls away northward, in the midst of which the twin white Percy Peaks alone seem fixed and motionless.

At a point 800 metres beyond and 225 metres higher, to which one can venture even when the alpine peaks are shrouded in fog, the view opens eastward down the sunny valley of the Androscoggin; the grandeur of King's Ravine, the queenly grace of the cone of Madison, the corrugated strength of the buttresses which that mountain throws boldly out into the northern air, contrast and vie with each other and with the glories of Jefferson and the far-reaching west.

If we wished to go to the top of Jefferson, we should leave

the main path near this point (4^k.7), and curve around to the right, keeping near the northern base of the west crest of Adams (really a spur of Saml. Adams) and above the scrub, until we came to Spaulding's Spring (temp. 42° F.) at the head of the Ravine of the Castles. Just beyond the top of the grassy slope that succeeds we should turn to look at the massive stone figure of the Sentinel who keeps guard, with clear-cut features and head well hooded, as befits his exposed position, near the entrance of the way to the Castles.

The ascent of the main path from 4k. (opposite Gray Knob) to the peak at 5^k.1, is by a succession of broad steps of gigantic dimensions, comparatively level pastures of sedge and alpine spear-grass alternating with slopes that abound in Mountain Cinque-Foil and Sandwort, Lapland *Diapensia*, *Vaccinium*, *Vitis-Idæa*, the latter, under its more prosaic name, recalling the long-to-be-remembered delights of a cow-berry-stew on the open, sunny, white ledge just above the woods after a night under shelter-tent, without fire, 1550 metres above sea-level. Along the upper portion of this section of the path the two alpine species of Rattlesnake Root appear, and yet beyond, in the hollow between F. 3. 4 and F. 3. 1 and on the plateau south of F. 3. 2, we shall find the Labrador Tea, Alpine Azalea, and Cassiope quite abundant.

The course of the path lies directly over the sharp peak at 5^k.1, whose elevation is 1635 metres, or rather more than that of Mt. Madison; thence, after the sudden descent to the grassy col between it and F. 3. 2 (elevation 1705 metres), crosses the apparent hollow that separates us from F. 3. 1, and climbs the main peak of Adams.

If we wish to view the symmetry and towering strength of the latter to best advantage, we clamber to the top of the knob of enormous boulders which we now call Saml. Adams (F. 3. 2). If our direct destination is King's Ravine, we branch off from the main path and curve around the Head Wall to the famous Gateway (.3g), whence we can at once descend by the new branch-path being prepared through the great Ravine to a point between 5^k.2 and 5^k.3, as previously mentioned; or we may interpolate a visit to Mt. Madison, Star Lake, and

the excellent camping-ground near the head of Snyder Brook, where we shall find water in Madison Spring at 40° F.

The advantages of the path of which we write were amply proven by use last summer. The average time of ascent has been reduced from six hours to four. A boy of but seven years and a considerable number of ladies have climbed by this way to Mt. Adams and visited the neighboring summits, and have repeated their first experience. The construction of this path has increased the interest in true mountain life, out of doors, in the woods, in camp, on the crags, ledges, and peaks. The records show that more visits were paid to the alpine regions of Mt. Adams in 1876 than in all previous years together, if we except 1875, when the tide of travel began to set that way; more than a hundred entries were made in our new record bottle on the summit of this mountain. Several nights have been spent at elevations of 1500 metres and upwards under a water-proof shelter-tent, the parties including ladies each time. There have been many delightful meetings of mountain lovers coming from different directions in those upper regions, as along ordinary lines of travel. Much convenience has also been afforded the topographical department of the Club in its work with the plane-table, topographical camera, and micrometer level. The points along the main path marked on the map .4d, .4h and .4r, were occupied by the camera as well as the point marked .5d (towards Mt. Jefferson) and the summit of Mt. Adams. By the aid of several series of barometrical observations, the grades of the path and the elevation of many prominent points along and near it have been approximately determined.

Thus we have made a beginning of Improvements in a difficult place. We have opened a comparatively easy way of access to the second loftiest peak of New England and one of its most interesting mountain forms, to the great northern ravines, to Mts. Madison and Jefferson, to mountain scenery which best combines beauty with grandeur. The work has been accomplished by the simple contagion of enthusiasm, and with the co-operation of the noble-souled man for whom this path has been named.

Map of the Mt. Adams Path.

BY J. RAYNER EDMANDS.

This is merely a skeleton map, in which only known points are shown. It is intended to serve three purposes:— first, to illustrate Mr. Nowell's paper; second, to aid explorers in keeping their way during fog; third, to indicate those points to which others should be referred in determining stream-lines, etc. To carry out the second object, the department of Improvements will have copies prepared in paraffine and placed in record bottles at many of the points. In regard to the third object, it is hoped that many members who use the path this year will endeavor to obtain material for the full map; and it is believed that the very conspicuousness of the omissions upon this one will call attention to the importance of so doing. In spite of the omissions, the map may prove useful to the naturalist for noting the place where a certain specimen was obtained or fact observed. Although the figures are not set down, the elevations of the points shown may, for these purposes, be assumed to be known.

The material on which this map is based was obtained last summer by a few members of the Club, with micrometer level, plane table, camera, compass and ten-metre line. The lower portion of the path is necessarily less accurate than the part above the woods.

The systematic nomenclature recommended by the committee of last year has been adopted and carried farther than their report directly recommended. An explanation of the extended system may be expected from the department of Topography at an early date.

A Mountain Suit for Women.

BY MRS. W. G. NOWELL.

Read May 9, 1877.

During the last few years ladies who are fond of pedestrian tours have found that their ordinary street costume is not adapted to country roads. To make themselves more comfortable many now wear a plain, untrimmed skirt a few inches shorter than the regular street dress. They fasten this to a blouse waist, thus letting the shoulders carry the burden, which they make as light as possible. This is very well, and if worn with proper underclothing is all that is needed for road walking. The arrangement of the underwear is really a matter of great importance to health and comfort. Too much cannot be said in favor of the emancipation waist, a somewhat new article of apparel. This will support all the garments and exclude the use of corsets, which are positively hurtful at all times, and especially so on a long walk. But when hard climbing is to be considered a different suit is required.

First of all, the feet should be properly shod. The sole of the boot should be fully as broad as the foot requires, and at least an inch longer than the foot. It should be of moderate thickness and have low, broad heels, if any at all. Some ladies have worn boys' canvass base-ball shoes with much comfort. They are sufficiently thick, are cool, and are made upon broad lasts. The idea of so dressing the feet will, no doubt, seem ludicrous to many, for some American ladies are as sensitive upon the shoe question as are the Chinese women. When we become true lovers of mountain exploration we shall forget this feminine weakness, and be willing to adopt whatever garb will help us to enjoy that which our masculine friends have so long and enthusiastically enjoyed alone.

With the feet properly shod and the underwear such as has been described, the next thing to consider is the suit for climbing. During the last summer we climbed Mt. Adams several times with ladies who wore the ordinary short dress.

Their progress, with two or three exceptions, was slow, not always from physical weakness, but from skirt entanglements. These garments managed to come in contact with rocks, stumps, and ram's horn, and sometimes we have known the fair owners of these skirts to be so entangled and made fast that jack-knives had to be brought out to cut them adrift. Emerging from these dilemmas, these women looked as if they had just come out of a London rag-fair. Their skirts were completely tattered and torn, and hung in rags and ribbons about them. But, apart from detention, annoyance, and general crestfallenness which skirts sometimes cause feminine mountain-climbers, there were three instances last summer where women came near receiving serious injuries because of them. One of these accidents happened to a lady while descending Tuckerman's Ravine. She wore a skirt shortened considerably from the usual road length for this particular climb, but it was, at the time of danger, in a much dilapidated condition. The lady was standing upon a rock in Tuckerman's Ravine. Some of the rags about the facing and braid of her skirt became fastened around a sharp, jutting point of rock, and she, unaware of this fact, sprang forward for a leap to another rock, when she was violently pulled back by her tightly secured pennants and precipitated over the edge of the rock and held there, the distance down to the landing below being twenty-five feet. Serious or fatal injury would have been her fate had it not been for the ever watchful care of the faithful guide, Charles Lowe. By his immense strength, and by the aid of the tattered garments, he dragged the terrified woman from over the abyss and placed her upon solid rock. This was done before even a member of the party knew of the peril. The fright, narrow escape, and nerve shock which came to this lady, naturally very brave, so affected her that the party was long delayed in the journey.

All the ladies of that party plainly said they never would attempt a climb like that in such unsuitable garments. Skirts having proved themselves so inconvenient and so dangerous, we tried to think of some suit which should be feminine and yet be adapted to exploring even primeval forests.

The only thing we could think of was a good flannel bathing-suit. We could not see why it should be more improper to wear this on the mountain heights and through the woods, than it would be along a crowded and fashionable beach.

This mountain-climbing suit is made of stout gray flannel. The upper garment is a long sack, reaching to the knees. This is neatly buttoned, and makes all the skirt that is needed. It is confined at the waist by a loose adjustable belt. The sleeves are full, and are gathered into bands at the wrist. The lower garments are loose, full, Turkish pants gathered into a band around the ankle. These are held up by being buttoned to the emancipation waist. Those who wish can have a skirt made of the same material which can be carried in the pack during the climb, and put on over the pants and under the sack skirt when needed. The suit can be made as ornamental or expensive as the wearer may choose. In this suit a lady, relieved of the excessive weight of her ordinary dress, could carry upon her back, by the aid of straps, at least fifteen pounds. The pack will contain her rations, blankets, and a few toilet necessities. Many ladies take great pride in carrying their own burdens, especially when the guides are loaded down with the packs of their weaker sisters, and the gentlemen of the party are encumbered with ponderous scientific instruments, as these Appalachians often are. Guides are willing and faithful, but it is painful to see them overtasked.

No wonder that gentlemen have been shy in asking us to accompany them in their explorations, for, in our ordinary attire, we must lag far behind, while they toil on ahead with double burdens, their own and ours.

Our dress has done all the mischief. For years it has kept us away from the glory of the woods and the grandeur of the mountain heights. It is time we should reform.

Map of the White Mountains.

The map which accompanies the present number of APPALACHIA is a part of the large map of the State, compiled and drawn by H. F. Walling, and recently published in atlas form.

This State map is based upon various careful geodetic surveys, including the United States Coast Survey, the Trigonometrical Survey of Massachusetts and the Survey of the National Boundary between the United States and Canada, made under the Ashburton treaty. The township lines, locations of streams, ponds, villages, post-offices, etc., were derived from the maps of counties, published at various times, and from railroad and other surveys, — some special surveys of the Connecticut River and of several roads among the mountains, having been made for the Geological Survey of the State under Professor Hitchcock.

The common roads were originally laid down upon the county maps from traverse surveys made with the wheel odometer and magnetic compass.

The contour lines, printed in brown, indicate heights above the level of the sea, compiled from various railroad and other surveys, and ascertained from original barometrical observations, principally under Professor Hitchcock's direction. It is not claimed that the topographical details indicated by the contours are minutely accurate, but they may be relied upon as presenting a fair portrait of the face of the country, so far as its main or characteristic features are concerned.

The brown heavy line from Lovel's Fort, by Ossipee Pond, to Lovel's Pond in Fryeburg, is the historical route of Lovel's march to Pigwacket, as interpreted and furnished by G. V. Fox, Esq.

The other brown line up the Pemigewassett, thence eastward to join the above, is the route of Willard's scouting-party, as indicated by the Committee on the discussion concerning the true name of the mountain called Pequawket or Kearsarge. For Mr. Fox's line and for the accuracy of the dotted portion of this line, they do not assume any responsibility.

The engraving and printing of the maps were executed by Julius Bien of New York, in the usual superior style of work done in his establishment.

Reports of the Councillors.**Natural History.****REPORT ON BOTANICAL WORK, PREPARED BY B. PICKMAN MANN.***Read May 9, 1877.*

Those members of the Club who take an interest in plants, and form or add to their collections every year, are requested to furnish the Department of Natural History with lists of their discoveries, including the localities and times of flowering of the respective plants they may find.

It is supposed that most of the visitors to the mountains will remain throughout the season within a comparatively small area of country. They can then make an approximately full flora of their abode for the season; or if they are moving about they can yet contribute some data to a general flora. For this purpose a set of tables has been constructed, in which is given a list, not very carefully worked up, of plants which may be looked for within the White Mountain district, in flower, in each month. In place of the names of the plants, numerals have been used, which correspond to those given against the names of the species in Mann's Catalogue of Plants.¹ Four columns are given in blank to contain the notes to be made by observers. These columns are intended to correspond to the four quarters (weeks) of each month, as equally divided as possible. When, therefore, an observer finds any plant in flower, he has only to place a check in the appropriate column against the number of the plant. Of course it is desirable that each list should refer to as small or as definite an area as possible. It is suggested that in the absence of any other limits which may seem to the observer more natural, the districts indicated by letters of the alphabet

¹ Price, 35 cts. Members of the Club, who will engage to report the results of their summer work to the Department of Natural History, can obtain copies of the catalogue, with as many sets of tables as they need, from the Secretary at 20 cts. each, besides postage (2 cts.), when postage must be paid. The tables are printed in four parts, the first for March, April, May and June, second July, third August, fourth September and October. Persons ordering them will please specify which parts are wanted. Extra copies of the tables, for private use, will be furnished at 10 cts. per set, or 5 cts. per single part.

in the sketch map in APPALACHIA No. 1, should be adopted as floral districts. The use of numerals in place of names make a transcription of the list so easy, that it is hoped each observer will rather prepare separate lists for every valley or prominent elevation, than merge into one list the observations made at many places. Detailed notes regarding very rare plants or especially rich localities should not be omitted.

Reports of the Councillors.

Topography.

BY J. RAYNER EDMANDS.

Read May 9, 1877

During the winter and spring much time has been spent in arranging to avail ourselves of the points determined by the U. S. Coast Survey. But the work of the Survey this year is of such importance to us as to warrant waiting for its results. The delay in announcing our primary positions, however, need not cripple our summer work.

The occupation of Mt. Washington by the Coast Survey and its promotion to a primary station is very fortunate; for we may temporarily count latitudes and longitudes from it, without waiting for its final adjustment, while the unadjusted directions of neighboring stations will be sufficiently accurate for our purposes. On the other hand, it is a matter of great regret that the branch of the Survey under Prof. Quimby is inactive from lack of Congressional appropriation.

For our secondary triangulation it is very desirable that some work should be done intermediate between the refined measurements of the Coast Survey and the performance of instruments in which portability is the prominent feature. Any one qualified and inclined to do such work, is requested to communicate with the department, in order that a consistent plan may be adopted for whatever is done. I hope to accomplish something in this line with a theodolite, and assistance would be acceptable from any who would hesitate to undertake the work themselves.

For the elevation of the principal points much is expected from the observations of Prof. Pickering, together with the Coast Survey determinations.

We look to individual members to obtain on their own responsibility many of the details. Make surveys of summits and other places where signals are erected, connecting the signal with neighboring buildings, prominent rocks, isolated trees, etc.

Determine the elevation of buildings near a railroad with reference to the nearest station or known point on the rails. Erect signals on prominent points. Run lines of approximate levels, and make a study of the best method for so doing. Meander streams, locating points thereon with reference to any known points visible. Make a study of the methods for such work best suited to our region. Note water-shed lines. Make a descriptive list of every tributary to a given stream between specified limits, with particulars as to each. Estimate the directions and distances of minor peaks from a main summit. A direction may be best given in this case by noting between what two distant summits the line falls, and specifying the ratio into which it divides the angle subtended. Make rough eye profiles at points likely to prove useful as stations, in order that the comparative value of various points may be weighed without revisiting them. Note what it is desirable to accomplish in a given neighborhood, even when unable to undertake the work. Should each member do a little of such work and *report the same to the Department*, more definite recommendations can be made next year.

Besides this miscellaneous work, systematic location of tertiary stations is much needed. The stations may be selected by the observer, care being taken to preserve the exact locations on the ground in such manner that the points may be used again. Prof. Quimby's printed directions for locating and describing stations, erecting signals, etc., will be sent to those desiring them. Plane-table angles from isolated stations will prove useful even where an extended system of connected points cannot be undertaken. Profiles with the topographical camera are also desired.

I have to acknowledge my indebtedness to Profs. Quimby

and Pickering for much valuable advice. For maps we have to depend as yet upon individual efforts in the several productions which have already appeared. In this respect, as well as some others, the work of the department goes on without as yet showing its results.

Reports of the Councillors.

Art.

BY JOHN WORCESTER.

Read May 9, 1877.

The Department of Art cannot offer a very brilliant programme for the coming summer. As we have no Club-room, we cannot invite extensive contributions of pictures, sketches, and photographs for permanent exhibition. For the most part our work must be subsidiary to that of other departments.

In aid of the Department of Topography, careful profiles of the scenes from mountain tops, with the peaks accurately named, are wanted. If these are contributed I shall be happy to compare them, and after taking pains to ensure correctness, present them to the Council, that they may be heliographed, published in APPALACHIA, and copies deposited in the bottles upon the mountains from which the views are taken. This will add much to the interest and instructiveness of a visit to those points.

Careful profiles or sketches of individual mountains from all sides, are also wanted for our mountain book, in which it is intended to present as full a description of every mountain as can be obtained.

It may perhaps be appropriate to this department to invite descriptions of beautiful scenes, written in the freshness of their own inspiration, to enliven the meetings of the Club during another winter. Brief notices of points from which unexpectedly interesting views are seen, will always be acceptable.

Reports of the Councillors.**Exploration.**

BY THE COMMITTEE APPOINTED APRIL 11, 1877.

Read May 9, 1877.

The Department of Exploration recommends action by the Club during the coming summer in the following directions:

- I. In the making of explorations;
- II. In the taking of observations and of notes;
- III. In the *transmission of the results to the Committee on Exploration.*

At the outset it may be well to call the attention of members of the Club to the importance of individual effort in carrying out its objects. Most of us are amateurs, all of us volunteers, and while we feel a general interest in the objects of the Club, no one feels it obligatory on himself to do any special work for it. We go to the mountains chiefly as a recreation, and half the benefit and pleasure of our trip may consist in its very aimlessness, in its having no definite object, and in its demanding of us no fixed plans.

The Committee feel that this state of affairs has a very important bearing on the question of what its recommendations should be. We desire to encourage exploration to the utmost, and are ready, so far as lies in our power, to act in an executive capacity in furtherance of any plans for explorations which may be suggested or desired by a large or a small number of members. But we feel that we cannot look, for the best part of our results, to plans and expeditions with particular and definite objects, prearranged for the Club as a whole.

We are scattered among the mountains, separated from each other by unneighborly distances, and only accidentally meeting in our trips from place to place. We may come together in goodly numbers to a field meeting of the Club, but we separate again after a day or two, and there is little opportunity for co-operation. But in our favorite regions, within our own circle of friends, we make many explorations; and in the departments in which we are particularly interested, or even if our interest centres upon mountain climbing sim-

ply, we cannot fail to observe facts and obtain experiences of interest and benefit to ourselves and others. It is these miscellaneous, incidental and almost accidental facts which the Department of Exploration desires to collect and preserve. The very fact of their being incidental makes them liable to be neglected, but these scattered observations are the main substance of our material, and it is from a great mass of such facts as these that we may hope to extract some important results.

The Department of Exploration considers itself, as it were, the grand contribution box of the Club. Whatever belongs specially to *no* department, belongs properly to us, and we desire the opportunity of making all those items, which taken by themselves seem of little value, useful as a whole.

To this end we urge each member of the Club to make notes upon every expedition or walk which may be made among the mountains, and to transmit these to the officers of this department; and we pledge our co-operation in putting all such information into an available shape.

I.

In regard to *Explorations*, we beg leave to refer to the report of the Councillor on Exploration, published in APPALACHIA No. 1 (p. 49). Thirteen regions are there mentioned, which are comparatively unknown. They are, most of them, extensive, some of them not, perhaps, of extraordinary interest, but many of them attractive, and promising to reward the explorer by the fineness of their scenery, or to stimulate the spirit of the mountaineer by the difficulty of their conquest. It would seem as if the numerous valleys about the Presidential Range afforded a specially attractive field for exploration; and the wild region between the Willey and Franconia Notches must contain all the varieties of mountain life and all the opportunities for mountain adventure.

Prof. Hitchcock says that there is one mountain in this last-named region the geological constitution of which is not known. The Club ought not to allow such a challenge to lie unanswered. We ought to have our table covered next fall with the characteristic mineral of Mt. Anderson!

II.

It is difficult to specify in what manner observations should be taken. The kinds of facts to be observed will differ almost as widely as the individual and local circumstances of each excursionist, and a great deal must be left to the judgment of the observer, and to the inspiration of the moment.

The notes taken should include:—

- (a.) A description of the trip;
- (b.) A table of the *times* of starting, stopping, arriving, etc., together with such calculations or estimates of distances, elevations, etc., as are available;
- (c.) A rough map of the route traversed.

(a.) The description of the trip should embrace a clear and succinct account of actual experiences; it should mention the names of the party; it should especially state the quantity, position, and nature, of the water found, — whether probably a permanent source, whether drinkable, etc.; it should include a general statement of the nature of the view obtained on any summit or prominent point, — whether there is a near or a distant horizon, whether there are any peculiarities in the view, *e. g.*, whether any two or more mountains are seen in line with each other, or whether any very distant mountains are visible; especially what portions of the horizon are cut off by any intervening object. Difficulties should be spoken of, — the presence of scrub fir, its extent and average height; the steepness or roughness of the surface, the occurrence of swamps, thick woods, large tracts of dead or fallen trees, should be noticed, etc., etc.

We will ask as a particular favor, that these descriptions may be written uniformly, on paper of letter size (20×25 cm.), with a margin at the left-hand side of the page, and that the writing be on one side of the paper only.

(b.) The observations of time should be taken when starting, at the beginning and end of every stop, if practicable, upon arriving at water, or at any marked point of the excursion, and *upon arriving at the destination*. The last-mentioned observation is very often forgotten in the excitement

and distraction of the "finish." It is desirable, also, to give one's average speed in walking on level ground, for the sake of comparison.

Experience seems to justify the statement that the relative *fatigue* involved in walks can be better measured by the times occupied than in any other way.

Distances should be given, when known; slopes should be *measured*, if possible, and if estimated, that fact should be stated, since the eye is in such matters an exceedingly unreliable instrument.

Barometrical observations, for the determination of elevations, are desirable.

Incidental observations on natural history should not be omitted.

(c.) A rough *map* of the region traversed will be found conducive to an intelligent understanding of the descriptions. Such a one may be made by tracing, from the sketch map bound with APPALACHIA, No. 1, the position of the neighboring summits, filling in with the eye or from memory, the intermediate features of the region. Among the details desirable, on such a map, are: the course of streams, with points of crossing; the general direction of ridges; the nature of the surface, whether woody, clear, rocky, or otherwise.

The *times* may be noted upon the map, along the course of the route taken.

It is hoped that, eventually, we may prepare a "mountain book" from these notes and from other sources of information. Such a book would contain all the facts, interesting or useful, to be known about each mountain or region, classified in some convenient way; and would be of great use to those who desire to extend their acquaintance to greater detail than is provided for in the guide books.

The information obtained in answer to these suggestions will be made accessible through the pages of APPALACHIA.

[NOTE. I am desirous of obtaining information of all distant points visible from any of the White Mountain summits, and would request any persons recognizing such points, this summer, kindly to forward their names to me through the

Secretary, or otherwise. If the mountain is not recognized, the angle between it and one or more known summits should be recorded. The easiest way to do this is simply to sketch a profile, including the mountain and at least two known summits. Three or more known summits should be included, if possible, in the view. Such profiles would be particularly desirable, were any Appalachian fortunate enough to be on Mt. Washington during "the finest day of the season," of which there are usually three or four in each summer. Interesting directions are towards Katahdin, Agamenticus, Wachusett, Killington Peak and the Adirondacks. Since the last APPALACHIA was published, I find that probably Greylock is not visible from Mt. Washington, as Mt. Croydon is directly in line, and if so would completely hide it. My authority for inserting Greylock in the list will be found in Osgood's White Mountain Guide Book, 1876, p. 249.

W. H. PICKERING.]

III.

Finally the Committee venture to offer a few hints to ladies, knowing that many who now regretfully watch their gentlemen friends start off for a mountain tramp in comfortable flannel shirts and suitable trousers, would gladly join them if it could be made possible — confident also, from much experience, that there are few climbs or mountain expeditions from which a vigorous woman need shrink.

In mountain climbing or in rambles in the woods beyond the regions of paths, it becomes necessary to have the free use of both hands, hence any costume that requires the constant occupation of at least one of them in order to advance at all, is plainly unfit for the purpose. Short skirts become a necessity, and even these need to be curtailed in rough mountain work. The best material for all purposes seems to be flannel, — not opera flannel in delicate shades, but stout twilled flannel or yachting cloth of some dark color, — navy blue and gray being easily obtained, — this being more comfortable in all weathers, not easily torn, and very easily washed.

A plain scant skirt reaching the tops of the boots, finished with hem and not facing and braid, with the body made as a

blouse or sack, as preferred, makes a dress that is not very noticeable, even at a hotel. An underskirt or petticoat, also of flannel, is desirable for cool weather, but is not a necessity. The costume is completed by drawers made of the same material as the dress, or of thinner flannel, if desired, loose and comfortable, buttoned about the leg or ankle. Corsets may be worn or not, as one feels the need, but if worn should be loose enough to be no confinement to the lungs. Boots should be broadly comfortable and of stout material, able to stand many a rough scrape or scratch, and keep their shape in spite of mud and water. Stockings of stout cotton, which leave nothing loose to catch on twig or stone, will be found more comfortable to walk in than flannel pants brought to the ankles, as we see gentlemen prove by the adoption of Knickerbocker suits for walking. Thus attired, and using discretion in not walking too fast or too far at a time, many ladies would astonish themselves before the end of the season by the distances they could accomplish without fatigue, to say nothing of the world of beauty to which they would be introduced.

Reports of the Councillors.

Improvements.

By WM. G. NOWELL.

Read May 9, 1877.

For a general scheme of work in this Department your Councillor must refer you to APPALACHIA, Vol. I. No. 1, pp. 51-57. In the present report he wishes merely to emphasize a few of the suggestions made therein, and to add some that arise from the experience of our first summer among the mountains.

I. — The Mt. Adams Paths. These should be completed nearly as designed. Especially should the best routes of travel between the points of chief interest in the alpine regions of the northern part of the Great Range be carefully ascertained and abundantly marked by signals. The path through King's Ravine ought to receive early attention, and

be put into as good condition as the nature of the ground will permit. A way into the Ravine of the Cascades should be cut from some point above the woods on the main path not far from 4^k.5, and also from A. M. C. camp at 3^k.5 across the face of the ridge, and the upper portion of the Ravine of the Castles be made accessible. Lines of approach to the Sentinel and the Castles, and also the snow patch that lies as late as August upon the east flank of Jefferson, should be chosen and indicated by rock signals. It is recommended that a north and south line, headed by the letter **N**, be grooved in some large rock on each summit and at each prominent point of departure in the alpine and subalpine regions, to assist pedestrians enveloped by thick fog-cloud. Upon rocks near each spring of good water a large letter **W** should be so painted as to be visible from prominent points within sight-range and from the paths of the vicinity.

Camping conveniences should be furnished near the head of Snyder Brook, between Mts. Madison and Adams, and among the scrub in the shallow lateral ravine just below 4k. on the main path.

Means for catching rain-water should also be provided at the latter place and near the top of Mt. Adams.

A pleasure-party camp should be built six hundred metres up the original path, and another at the fall in King's Ravine, somewhat more than three kilometres from the road.

The A. M. C. camp, near 3k. (main path), should be duplicated not far from its present site.

In King's Ravine, up beyond the alders, by a sweet brook that flows among the trees that stand within rifle-shot of the great Head-Wall, a large permanent camp should be built of timber and bark. Such a camp, there placed, would attract many visitors, and could be easily reached by those whom storm might drive from an intended camp at the head of Snyder Brook.

II. — Carter Notch and Carter Dome. Your Councillor suggests that a working party in two sections — one to start from Jackson, the other from the Glen — begin early in July the construction of the Paths recommended in the Report of the Exploration of Aug. 26, 27, 1876, printed in APPALA-

CHIA, Vol. I. No. 2. The entire length of these paths will be not far from sixteen kilometres (about ten miles). The contributions of the proprietors of the Glen House and the Thorn Mt. House, and other friends of the Club, will suffice to hire the severer labor involved in the undertaking, and Mr. Chas. E. Lowe has been engaged to provide for the heaviest part of the timber-cutting necessary on the northern slope, and Mr. Jonathan G. Davis for that required on the southern slope. Several members of the Club could assist to advantage in this work, and in properly measuring and marking the paths, and accurately determining the compass directions and grades along their courses.

Permanent camps will be needed near the Ponds, and probably near the summit of Carter Dome. Eventually the erection of a Mountain or Notch House of no mean dimensions, will be undertaken by the hotel proprietors, and might be prepared for this summer.

Upon Carter Dome a somewhat extensive clearing must be made, and an observatory built of the dwarf firs felled. Clearings should also be made for view-points, along the southwest spur over the boulder-heaps of the Notch, and along the Great Slide.

III. — Mts. Surprise and Moriah. So many members of the Club pass their summers in the neighborhood of these mountains, that your Councillor is led to recommend that the old path over the lesser summit, unexpectedly beautiful in prospect, to the grand head of far-viewing Moriah, be reopened, measured, and plainly marked, both at its entrance and along its whole length.

IV. — Mt. Starr King. Let those of us who visit Jefferson Hill this year, see that the lower part of the old path up this much frequented mountain is thoroughly bushed out, and certain other portions, especially that between the south spur and the main peak, be made more clear and open. The whole path should be measured and marked, but there is particular need that its course up from the hotels through the pasture and into the woods, be prominently indicated by sign-boards and signals.

V. — Mt. Willey. It is desirable that a good path be made

to the summit of this mountain on account of the fine view it affords, its proximity to other much frequented localities, and the interest that attaches to it in connection with the famous Willey slide. The path should probably be located on the north bank of the brook next south of Moore's Brook, as far as the stream can be followed, and from its head strike direct for the top of the mountain. (See APPALACHIA, Vol. I. No. 2, p. 120.)

VI.—Mt. Crawford Path. This needs renewing; and the work could easily be accomplished in conjunction with that suggested in the preceding paragraph, by a party encamping in the Saco Valley, with a stout woodsman as auxiliary.

VII.—Tuckerman's Ravine. To mate with our avenue through King's Ravine on the north, here on the south of the Great Range, a way along the whole length of Cutler's tributary to the Ellis River should be prepared for the more hardy and adventurous among the many visitors whom the silver beauty of the Crystal Cascade attracts to the lower part of that ice-fed stream. Easily cut through the tall growth of the lower two miles of its true right bank, through the alders that flank and cover the noisy current as it slips and tumbles down the rocky bottom of the Ravine, the path should be made, though by difficult labor, much wider than usual, in order that it may be permanent. With their natural tendencies to spread and sprawl increased by the pressure of snows twenty to thirty metres deep, and by the constant temptations of moist crevices and exposed sunny rock-faces, the alders would soon obstruct a path less than three metres wide. But well done, this work would prove as complete a source of satisfaction as any that the Club can undertake in this department.

In offering these suggestions, your Councillor is happy to be able to call attention to the fact that a considerable portion of the work herein recommended is already well begun, and to state that there is reasonable expectation that the whole will be accomplished before the snows shall again cover the field of our summer operations. Members of the Club may find it more convenient to do work of this sort in other localities among the mountains. If so, they have but to set their hands to it, and it will be done.

A List of Alpine Serials.

BY SAMUEL H. SCUDDER.

Read May 9, 1877.

The following catalogue embraces all serial publications of Alpine Clubs, or independent journals devoted to mountaineering, concerning which any information could be obtained. Most of the references are drawn from the standard bibliographies of Germany, Switzerland, France, and Italy, and being at second hand are liable to error. It is believed, however, that few important journals have been overlooked, and as the first bibliographical list of this nature, it may prove of some interest.

ENGLAND.

London. — The Alpine Club.

The Alpine Journal; a record of mountain adventure and scientific observations. By members of the Alpine Club, 1868-76. 7 v. 8°.

NORWAY.

Christiania. — Norske Turistforening.

Arbog, 1869-75 (1870-76). 7 v. 8°.

FRANCE.

Paris. — Club alpin français.

Annuaire. Ann. 1-2, 1874-75 (1875-76). 2 v. 8°.

Besançon. — Club alpin français, Section du Jura.

Bulletin No. 1. Sept., 1875. 32 pp. 8°.

Chalons-sur-Saône. — Club alpin français. Section de Saône-et-Loire.

Bulletin No. 1. 1876. 24 pp. 8°.

Grenoble. — Société des Touristes du Dauphiné.

Annuaire. Ann. 1, 1875 (1876). 1 v. 8°.

GERMANY, INCLUDING AUSTRIA.

Vienna. — Oesterreichischer Alpen-Verein.

Mittheilungen, Bd. 1. 1863. 1 v. 8°.

Verhandlungen, Heft 1. 1864. 1 v. 8°.

Jahrbuch [Neue Folge der Vereins-Publicationen], Bd. 1-9, 1865-73. 9 v. 8°. Continued as: Zeitschrift des deutschen und oesterr. Alpen-Vereins, published at Munich.

Munich. — Deutscher Alpen-Verein.

Zeitschrift, Bd. 1-2, 1869-71. 2 v. 8°. Continued as Zeitschr. d. deutsch. und oesterr. Alpen-Vereins, published in the same place.

Munich. — Deutscher und oesterreichischer Alpen-Verein.

Zeitschrift, Jahrg. 1872-76. [= Bd. III-VII, Zeitschr. d. deutsch. A.-V., and 10-14 Jahrgang, Publicationen d. oesterreich. A.-V.] 5 v. 8°.

Frankfurt a. M. — Deutscher und oesterreicher Alpen-Verein.

Mittheilungen, Jahrg. 1-2, 1875-76. 2 v. 8°.

Gera. — Der Alpenfreund. Blätter für Verbreitung von Alpenkunde unter Jung und Alt in populären und unterhaltenden Schilderungen aus dem Gesamtgebiet der Alpenwelt, und mit praktischen Winken zur genussvollen Bereisung derselben; von Amthor. Bd. 1-9, 1868-76. 9 v. 8°.

SWITZERLAND.

Bern. — Schweizerische Alpen Club.

Jahrbuch, Jahrg. 1-11, 1864-76. 11 v. 8°.

Geneva. — Sections romandes du Club alpin suisse.

L'Echo des alpes. Ann. 1871-76. 6 v. 8°. [Published earlier?]

Aarau. — Schweizerischer alpwirtschaftliche Verein.

Alpwirtschaftliche Monatsblätter. Zeitschrift für Alpwirthe, Milchwirthe, Alpenossenschaften u. s. w. Jahrg. 1-10, 1867-76. 10 v. 8°.

Winterthur. — Alpina: eine Schrift der genauen Kenntniss der Alpen gewidmet; von Von Salis und Steinmüller. Vols. 1-4, 1806-08. 4 v. 8°.

Neue Alpina. Eine Schrift der schweizerischen Naturgeschichte Alpen- und Landwirthschaft gewidmet; von Steinmüller. Vols. 1-2, 1821-27. 2 v. 8°.

Zurich [and Glarus]. — Alpenpost. Repertorium der gesammten Alpenkunde und Touristik; red. Semm. [The latter part of the title reads variously, the following being some of the changes: — Blätter zur Förderung des Touristenverkehrs, zur Hebung der Curanstalten und der montanen Industrien und speziell zur Hebung und Pflege der alpinen Wissenschaft. — Repertorium der gesammten Alpenkunde. Populärwissenschaftliche Blätter für die gebildete Welt. — Organ für Alpenkunde und Touristik, Balneologie und Hotellerie.] Bd. 1-6, 1869-74. 8 v. 4°.

Die neue Alpenpost. Organ für Alpenkunde und Touristik. 1875-76. 2 v. 4°.

ITALY.

Turin. — Club alpino italiano.

L'Alpinista, periodico mensile. 1874- . 8°.

Bollettino trimestrale. Vols. 1-2 (= Nos. 1-11) 186- -68. 2 v. 8°.

Bollettino trimestrale; relazione di escursione e salite, osservazioni scientifiche e particolarità alpestri, pubblicato per cura della direzione centrale e distribuito gratis ai soci del Club. Vols. 3-11 (= Nos. 12-29). 1868-77. 9 v. 8°.

Osservazioni meteorologiche. Ann. 1-5, 1872-76. 5 n. folding 8°.

UNITED STATES.

Boston. — Appalachian Mountain Club.

Appalachia. Vol. 1. Nos. 1-3, 1876-77. 3 n. 8°.

Members added since March, 1877.

HONORARY.

Dana, James D., New Haven, Conn.	Selwyn, A. R. C., Montreal, P. Q.
Guyot, Arnold, Princeton, N. J.	Tuckerman, Edward, Amherst, Ms.
Hall, James, Albany, N. Y.	Tyndall, John, London, Eng.
Henry, Joseph, Washington, D. C.	

CORRESPONDING.

Blake, Wm. P., New Haven, Conn.	Hilgard, J. E., Washington, D.C.
Brewer, Wm. H., " "	Houston, Edwin J., " "
Chickering, J. W., Jr., Wash'n, D.C.	King, Clarence, New York.
Dall, Wm. H., " "	Marsh, O. C., New Haven, Conn.
Emmons, S. F., Boston, Mass.	Murray, Alexander, St. Johns, Newfoundland.
Gardner, James T., Albany, N. Y.	Stevenson, J. J., New York.
Gilman, Daniel C., Baltimore, Md.	
Hayden, F. V., Washington, D.C.	

ACTIVE.

Ames, Chas. H., Boston, Mass.	Jesup, Henry G., Hanover, N. H.
Atkins, E. F., " "	Keith, Herbert F., Grafton, Mass.
Bailey, Wm. W., Providence, R. I.	Keudall, Joshua, Cambridgep't, Ms.
Caryl, Miss Harriet E., Boston, Ms.	Page, Miss Edith, Boston, "
Cook, Eugene B., Hoboken, N. J.	Packard, A. S., Jr., Salem, "
Crawford, Gilbert H., New York.	Pychowska, Mrs. L. D., Hoboken, N. J.
Cummings, John, Woburn, Mass.	
Emerton, J. H., Salem, "	Rice, H. M., Providence, R. I.
Evans, Alfred R., Gorham, N. H.	Shafter, Miss S. M., San Fran., Cal.
Gamble, Mrs. H. D., N. Conway, N.H.	Stafford, F. I., Montreal, P. Q.
Gamble, James H., " "	Thayer, S. Proctor, No. Adams, Ms.
Gray, Francis C., Boston, Mass.	Tilden, Miss Maria D., Boston, "
Hamlin, Chas. E., Cambridge, Mass.	Tuttle, Albert H., Columbus, Ohio.
Hardy, A. S., Hanover, N. H.	Willis, Hamilton, Boston, Mass.

Proceedings of the Club.

February 14, 1877. — Tenth Regular Meeting.

President Scudder in the chair.

A letter was read from Mr. Thomas Gaffield, enclosing one from Lieut. A. W. Greeley, with reference to Capt. Howgate's proposed arctic expedition, Mr. Gaffield requesting the Club to take some action favoring the proposed plan.

On motion of Mr. Nowell a committee of three, consisting of Messrs. E. C. Pickering, N. S. Shaler, and L. F. Pourtales, was appointed by the chair, to report what action, if any, should be taken with reference to the communication, and the Council was empowered to act for the Club in accordance with the report of the committee.

On motion of Prof. Pickering the committee was instructed to report resolutions favoring the proposed plan.

Mr. Dimmock read a paper describing a trip to Mt. Mitchell. (See p. 141.)

Miss Whitman read a paper describing an ascent of Mt. Washington through Tuckerman's Ravine. (See p. 131.)

On motion of Mr. Worcester, Mr. Dimmock and Miss Whitman were requested to furnish copies of their papers for publication in APPALACHIA.

Osgood's White Mountain Guide Book was then discussed, and errors were pointed out in a letter from Mr. Lowe of Randolph, N. H., and by Prof. Fay, Mr. Worcester, Prof. Pickering, Mr. W. H. Pickering, and Mr. Edmands.

The meeting then adjourned.

March 14, 1877. — Eleventh Regular Meeting.

President Scudder in the chair.

Mr. Dimmock called attention to a course of lectures on botanical subjects, in progress at the Sanders Theatre in Cambridge, and invited persons interested in them to attend.

Mr. Nowell asked members to send to the Councillors any suggestions that might occur to them with reference to the summer work of the Club, in order that they might be used in the preparation of the reports to be presented in May.

Prof. Huntington read a paper describing an exploration of the sources of the Connecticut River.

Mr. G. C. Mann read a paper describing several botanical excursions on the Great Range of the White Mts., and deposited with the Secretary a list of the plants found.

Mr. Worcester moved that the thanks of the Club be presented to the

artists who had contributed to the exhibition of paintings made at this meeting. Passed.

The meeting then adjourned, the room remaining open an hour later to afford opportunity of viewing a collection of between forty and fifty paintings and sketches of mountain scenery, which had been contributed by the artists of Boston and vicinity, and by members of the Club.

On Thursday, March 15, the room was again opened during the afternoon and evening for an exhibition of the pictures.

April 11, 1877. — Twelfth Regular Meeting.

President Scudder in the chair.

Prof. Hitchcock asked to have a committee appointed to assist him in the discharge of his duties as Councillor on Exploration. Mr. G. C. Mann, Mr. W. H. Pickering, and Miss M. F. Whitman were appointed.

Prof. Quimby spoke of the probability that the appropriation by Congress for the Coast Survey work under his charge would not be made this year, and asked the Club to use whatever influence it might have to secure the appropriation.

On motion of Col. Folsom the matter was referred to the Council, with power to act for the Club.

Prof. Pickering said that there was danger of the New York State Survey being cut off by the Legislature of that State, and on his motion this subject was also referred to the Council.

Mr. Fox then opened the discussion on the name of the mountain in Carroll Co., N. H., called variously Kiarsarge, Kearsarge, and Pequawket. He presented evidence to show that the mountain had been known by the name Kearsarge, or its equivalent, from the earliest times, and that it had never been popularly known by any other name. Also that the mountain in Merrimack Co., which is also known as Kearsarge, had a well authenticated Indian name, Cowissewaschook, while the Carroll Co. mountain had no known Indian name. From which he argued that, if it were necessary to change the name of either mountain to avoid confusion, the name Kearsarge should be applied to that in Carroll Co., and the old Indian name, Cowissewaschook, restored to that in Merrimack Co.

Mr. Emery then presented evidence to show that the name Kearsarge, or its equivalent, was applied to the Merrimack Co. mountain much earlier than to that in Carroll Co. Also that the name Pequawket was applied to the latter earlier than the name Kearsarge. From which he argued that the name Kearsarge belonged of right to the Merrimack Co. mountain, and that the true name of the Carroll Co. mountain was Pequawket.

Prof. Hitchcock offered evidence to show that the Carroll Co. mountain had been popularly known as Pequawket, and that the name Kearsarge had been given it by settlers coming from the vicinity of the Merrimack Co. mountain. He therefore favored the name Pequawket for the former as a means of distinguishing it from the latter, especially for scientific purposes.

Mr. Worcester said that, until within a few years, the name of the Carroll Co. mountain had been Kiarsarge, not Kearsarge. The village at its foot, which was named from it, was Kiarsarge Village, and all the old guide boards had that spelling, which was also used by the hotel on the summit, and until recently by the hotel of the same name in North Conway. He thought that at least that distinction should be retained between this mountain and that in Merrimack Co. He proposed as a compromise, and as perhaps aiding in finally changing the name of the former to Pequawket, that it be called "the Pequawket Kearsarge."

The Secretary read a letter from Dr. Bouton of the New Hampshire Historical Society, testifying that, so far as he knew, the members of that Society were "unanimously of the opinion that the true and only 'Kearsarge' was that in Merrimack Co." He remarked that upon all the old maps the name in question, when applied to either mountain, was spelled Kiarsarge, or in some way necessitating that pronunciation of the first syllable. Also that, on several of the oldest of these maps, the name was applied to the Merrimack Co. mountain, while that in Carroll Co. was left nameless.

Prof. Fay, Mr. Barrows of Fryeburg, Me., Hon. Chas. L. Woodbury, and Mr. Hamilton Willis also took part in the discussion.

Prof. Pickering moved that a committee of three be appointed to collect and collate the evidence presented, in order that it might be made available to the Coast Survey and other parties interested. (See Report, p. 152.)

Messrs. Nowell, Worcester, and Fay were appointed.

The meeting then adjourned.

May 9, 1877. — Thirteenth Regular Meeting.

President Scudder in the chair.

The President spoke of a list of the alpine serial publications of Europe and America, which he had prepared for APPALACHIA No. 3. (See p. 198.)

Prof. Fay announced a field meeting to be held at Arlington Heights, on Saturday, May 26.

Mr. Nowell spoke of a new paper just started in Gorham, N. H., called "The Mountain," which proposed to devote considerable space to matters of interest to mountain tourists.

Mr. B. P. Mann presented a plan for obtaining information of the plants found among the mountains. (See p. 185.)

Mr. Edmands, as Councillor on Topography, presented his report. (See p. 186.)

Mr. Worcester reported work to be done for the department of Art. (See p. 188.)

Mr. G. C. Mann presented the report of the Committee on Exploration. (See p. 189.)

Mr. Nowell reported work to be done in the department of Improvements. (See p. 194.)

On motion of Prof. Fay, Mr. W. H. Pickering was requested to prepare an article describing convenient instruments for the use of explorers. (See p. 165.)

Mr. Edmands showed a knapsack similar to those shown by himself and Prof. Morse last year, but with some improvements.

Mr. Nowell showed a similar knapsack, but with steel bows instead of wood. Also a tent used by him during the last summer.

Mr. Jenney showed a tent made of stout cotton cloth waterproofed with paraffine, the cloth being dipped in a solution of paraffine in naphtha, and then the naphtha allowed to evaporate. He said that it was an improvement to dissolve a small proportion of soft rubber along with the paraffine.

Mr. Scott, for Miss Whitman, showed a lady's belt arranged for carrying various articles of necessity and convenience in mountain climbing.

Mrs. Nowell spoke of the disadvantage of ladies on mountain excursions, on account of their long skirts, and recommended the use of gymnasium dresses or something similar, as an outside garment for such occasions.

Miss Whitman recommended the plan of making the dress so that the skirt could be shortened to any necessary extent by rolling it up.

Mr. Edmands spoke of a form of pocket drinking-cup made of enamelled cloth.

Prof. Huntington described a method of building a log raft for crossing streams or lakes.

Mr. Henck spoke of the use of paraffine for waterproofing cloth. He also called attention to Gould's "How to Camp Out," a little book giving many practical instructions for campers.

Prof. Pitman described a form of camp bed which he had used.

The meeting then adjourned.

June 2, 1877. — Second Field Meeting.

Held at the Barnard House, Arlington Heights, Mass.

President Scudder in the chair.

Mr. Burbank spoke of the geology of the surrounding region, speaking especially of the so-called "Cambridge Basin" and its characteristic rocks.

Prof. Fay gave an account of the principal mountains to be seen from the Heights.

Mr. Edmands showed Prof. Pickering's micrometer level and a Coast Survey alidade.

Mr. Walling showed a telemeter rod, and described its use in connection with the alidade shown by Mr. Edmands.

Mr. G. C. Mann spoke of the view from Prospect Hill in Waltham.

Mr. W. H. Pickering spoke of some distant points visible from the Heights.

Mr. Walling showed a proof of the map to be published in the present number of *APPALACHIA*.

Mr. Scott, on behalf of the Lexington Field and Garden Club, invited the Appalachian Mountain Club to join in a field meeting at Lexington, suggesting Saturday, June 16, as a convenient day.

On motion of Prof. Fay the invitation was accepted.

Messrs. Scott and Henck were appointed a committee of arrangements.

The meeting then adjourned.

The air was so thick that very little was to be seen beyond a radius of ten miles.

June 13, 1877. — Fourteenth Regular Meeting.

President Scudder in the chair.

The President spoke of a collection of one hundred charts of the mountainous portions of the coast of the United States, from the U. S. Coast Survey, and a collection of books and maps from the Engineer Department of the U. S. Army, which had been presented to the Club since its last meeting.

On motion of Mr. Nowell a vote of thanks for these gifts was passed.

Mr. Scott, on behalf of the Lexington Field and Garden Club, repeated its invitation to the Appalachian Mountain Club to take part in a field meeting at Lexington on Saturday, June 16.

Mr. Nowell reported that Mr. Lowe had cut a path from the Ponds, near the summit of Carter Notch, out to the Glen House.

Mr. W. H. Pickering exhibited a new instrument to be used as a substitute for the plane-table. He claimed that it would give greater accuracy besides being very much smaller and lighter. He also showed a still smaller instrument of a similar nature, and a heliotrope attachment to the larger instrument.

Prof. Cross spoke of a number of barometrical measurements of heights, which he and Prof. Clarke had made during the summer of 1876.

Prof. E. C. Pickering mentioned the probability that the errors of barometrical measurements are largely due to incorrect observations of temperature.

Mr. Edmands exhibited his improved topographical camera, explaining its use as a camera and as a plane-table. (See p. 168.)

Prof. Pickering spoke of the desirability of preparing a mountain circular, to be used in collecting information about the various mountains, and offered some suggestions in regard to it. The committee on printing were authorized to insert such a circular in APPALACHIA No. 3.

President Scudder exhibited a small tent, so arranged as to be used as an A tent for two persons or a lean-to for three or more.

The meeting then adjourned.

June 16, 1877. — Third Field Meeting.

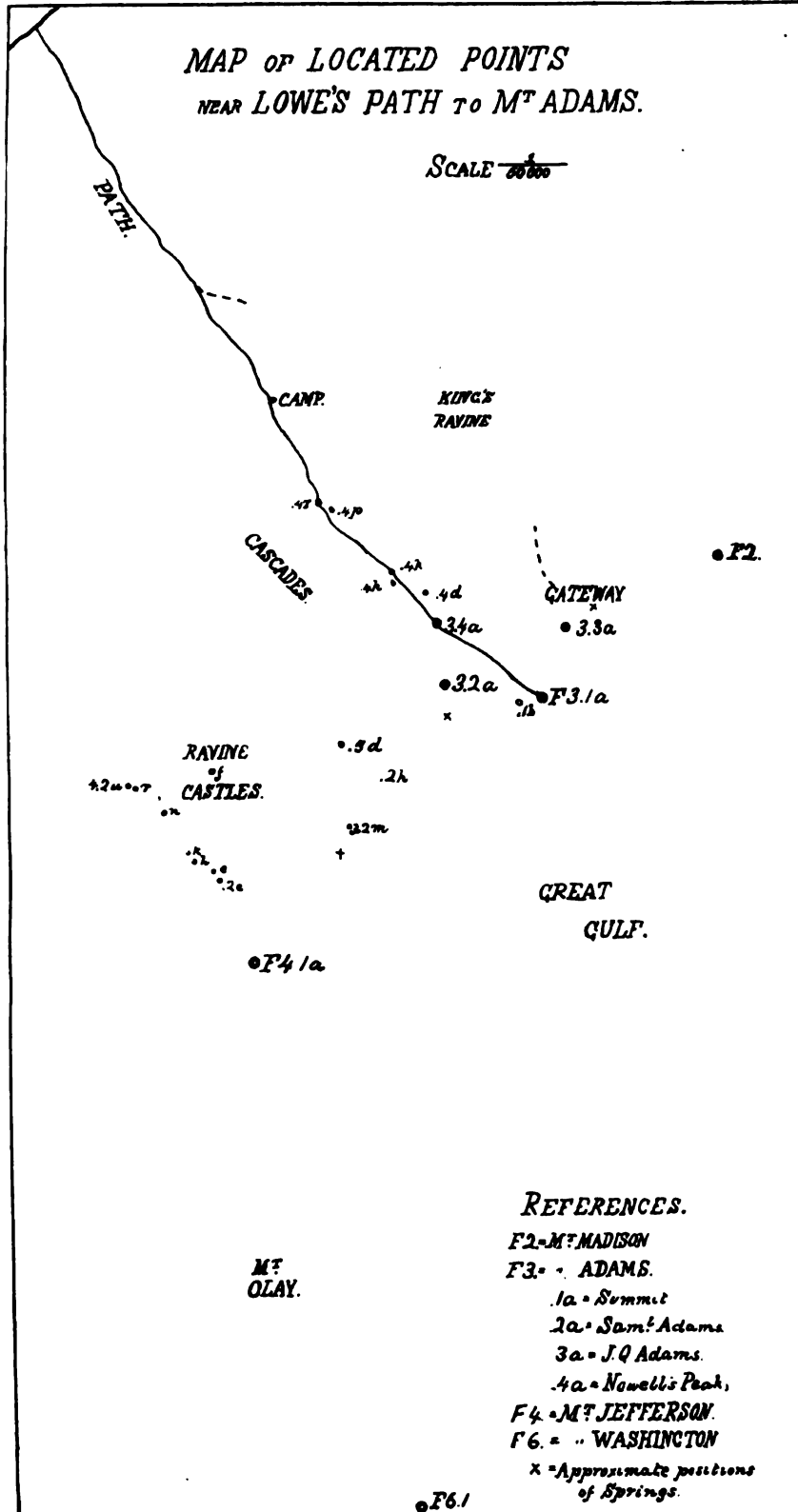
Held at Lexington, Mass., by invitation of the Lexington
Field and Garden Club.

Arriving in Lexington by the 8:15 A. M. train from Boston, the Club was received by members of the Field and Garden Club. A pleasant walk through the village brought the party to the residence of Mr. Merriam, the President of the Club, where a short stop was made to visit his greenhouses. From Mr. Merriam's place the party passed through the adjoining grounds of Mr. Brown and Mr. Hayes to the house of the latter, where strawberries and cream were served. Thence through Mr. Hayes's grounds to Hancock Height, formerly known as Granny's Hill, from which a fine view was obtained of the surrounding country, and of Mt. Wachusett and the mountains of southern New Hampshire.

After spending an hour on the Height, wagons were taken to Shaker Glen, where, after a half hour's ramble up the Glen, a lunch was served; after which remarks were made by Prof. Fay, inviting the Lexington Club to attend the meetings of the Appalachian Club; by Mr. Burbank on the Geology of the Glen; and by Mr. W. H. Pickering on the distant points visible from the Height. A pleasant stroll through the lower part of the Glen was then taken, after which the party returned in wagons to the village, spending half an hour in the town hall and library before taking the 6:25 train for Boston.

MAP OF LOCATED POINTS
NEAR LOWE'S PATH TO M^T ADAMS.

SCALE $\frac{1}{20000}$



APPALACHIA.

VOL. I. BOSTON, FEBRUARY, 1878. No. 4.

The Annual Address of the President.

BY SAMUEL H. SCUDDER.

January 9, 1878.

Our first President, on withdrawing from office, very appropriately sketched for you the formation and early history of this Association, which owed its existence in large measure to his enterprise, scientific standing and zeal. He thus placed on record what would otherwise have been known to our successors only by uncertain tradition. The more recent history of our Club, however, is written in its published Proceedings, and it would be a work of supererogation for me to pass it in extended review at this time. In inviting your attention, therefore, to the explorations and surveys of various kinds which have been undertaken in North America during the past year, I shall be complementing the work of the Club, and prove, I hope, how deep and wide-spread is that zeal for the acquisition of geographical knowledge — using that term in its broadest signification — which, in this district, shows its energy through the medium of our Association.

Unquestionably, the most important among these explorations are the government surveys of the unsettled parts of the national domain. The oldest of these, the Geological and Geographical Survey of the Territories, under Dr. Hayden, last year completed its field work in Colorado; so that this new state, although perhaps the most diversified in our union, enters upon life under most propitious circumstances, its whole terri-

tory better mapped than perhaps any older state. This season the survey has passed northward into Wyoming and Idaho, taking in a tract of country between 107° - 112° W. Long., extending from the Pacific Railway northward to the Yellowstone Park—an area of about 30,000 square miles. This field of operations, a preliminary survey of which was made in 1872, may be more easily conceived by stating that its southern border is equal to the distance from here to Philadelphia or Montreal. A geodetic party carried the primary triangulation over this entire region, measuring two base-lines, one near Rawlins, the other near Bear Lake, locating prominent peaks at intervals of from twenty to thirty miles, building upon them stone monuments for future recognition, and travelling at least five hundred miles. Thirty stations were occupied and eleven more used as primary points, and an average of eight angles were measured at each station occupied; at the close of the season, the triangulation was connected near Ogden with that of the Fortieth Parallel Survey.

This region was also divided into three sections, each of which was covered by a distinct party, fully equipped for topographical and geological work; two of these divided between them the southern portion, including all the less diversified desert region, while the third took the elevated district in the northwest, in the immediate vicinity of the Yellowstone Park.

The southeast or Sweetwater division, as it was called, embraced an area of nearly 11,000 square miles, extending northward to $41^{\circ} 45'$ N. Lat., and westward to $109^{\circ} 30'$ W. Long. In working this area, one hundred and seventy-one principal topographical stations were occupied, besides twenty or more subsidiary stations; eighty or more stone monuments were erected. While many of these stations, owing to the extremely desolate and irreclaimable character of the country surveyed, will probably never be used as initial points for detailed surveys, there still remain many others, which will be of great value as starting points for isolated pieces of rectilinear work, where fertile valleys and oases in the desert country are rapidly coming into demand by settlers. The most important of these fertile valleys lie in the mountainous region to the north, in the

upper waters of tributaries of the Platte and Yellowstone; and into this district a rectilinear survey was pushed by measuring a guide-meridian from the railway north, and the establishment of base-lines within the region itself. The guide-meridian had to be measured over seventy-five miles of desert country, where water was extremely scarce. Owing to threatened danger from hostile Indians, who were known to be in the vicinity of the Big Horn Mountains, the party was obliged to leave in the northeast about eight hundred square miles of unexplored territory.

The southwest or Green River division was a rectangle of similar size to the last, but the surveying party extended its work a little beyond its western limits, so that 12,000-13,000 square miles were surveyed. This area contains a greater extent of hilly country, but none so elevated as that in the northern portion of the Sweetwater district, and in it nearly three hundred and fifty stations and locations were made, more than fifty of which were marked with stone monuments. The party found the Green River basin a broad, flat, almost unbroken expanse, covered mainly with sage brush and scattered bunch grass, but the bottom lands well grassed and wooded. In the broken country to the West, they found the more elevated portions heavily timbered, the hilly parts grass-covered and the valleys filled with good soil, easily irrigable.

The Teton division to the north, extended to the borders of the Yellowstone Park, between 109° and 112° W. Long., covering an area of 13,500 square miles, mostly drained by the branches of the Shoshone or Snake River, a tributary of the Columbia. This was familiar ground to the chief of the party, since he had already partially surveyed the region in 1872. In its western portion the party made thirty topographical stations in an area of about 10,000 square miles. They found considerable timber, with a fair average of arable and grass-land, and streams never dry. The eastern and northern portion is far more rugged and inaccessible than any other portion of the country covered by this year's survey. It finds its culmination in the snow-covered Teton and Wind River Mountains, in the latter of which the highest elevation is Fremont's Peak, 13,700

feet high ; a comparison of Fremont's account with the observations of the party show, however, that he did not ascend this highest peak (now bearing his name), but a lower summit, whose altitude he estimated to be 13,570 feet. In one sense Fremont's Peak may be considered the centre of the continent, since from its summit may be seen in close proximity the headwaters of streams which feed the Columbia, the Colorado and the Missouri. While engaged in the exploration of this district, the party received notice from the military commander at Camp Brown, through Indian scouts, to leave the country, on account of the danger from hostile Indians. Nearly a month of valuable time was thus lost, abridging somewhat the results of the season's work. Notwithstanding the various difficulties encountered, the party surveyed an area of about 6,000 square miles of the most rugged mountain country in the northwest, and made over one hundred barometrical observations. Throughout his district, Mr. Bechler personally observed 7,340 horizontal and 5,700 vertical angles ; and as they were repeated backward and forward, and checked by good barometric readings, they must give satisfactory results concerning the altitude of that extremely mountainous country.

Each of these three topographical parties was accompanied by a geologist. In the desert region careful notes were taken of the grazing facilities, timber and irrigability of the country ; it was estimated that in the least favored region — that to the east—only five-eighths was desert land, one-fourth being mountainous, and therefore more or less timbered, and one-eighth valuable land ; at one point beds of coal of great extent were found. The limitless expanse of bunch-grass land affords, in some otherwise desert country, grazing to enormous herds of cattle. Some parts of the country are not so desolate. In the western portion of the Green River district, the valley of the Bear River, which doubles so curiously upon itself near the famous soda-springs of Idaho, already supports a thriving population ; along its banks and in the neighboring region are fine acres of farming land, grass-covered hills, broad and fertile valleys. Throughout the region, the party noticed that the season was much colder than that experienced at the same alti-

tudes in Colorado. In the mountainous regions to the north, especially along the western flanks of the Wind River range, remains were noticed of huge ancient glaciers, and considering the enormous amount of snow and ice that was observed at the beginning of August, the geologists considered that the discovery of still existing glaciers in that range would not be surprising. Moraines covering many square miles, often a thousand feet in thickness, extend downward through narrow valleys, now containing rushing streams, and from all appearances, cessation of glacial activity must have occurred within a comparatively recent time; for scarcely any vegetation has sprung up on the light glacial soil, and the morainal deposits themselves bear every mark of freshness.

In the comparatively level country lying wholly within the territory of Wyoming, stretching from the Wind River and Sweetwater Mountains to the Uintahs, and through the middle of which the Pacific Railroad winds its way, the geologists found little besides nearly horizontal tertiary strata, such as occur along the line of the railway. The mountains west of Green River are composed mainly of carboniferous limestones, but are flanked on either side by hills of jurassic and cretaceous age, with tertiary beds resting on the tilted edges of the older rocks. Still further west, the Bear River Mountains in Utah are composed of silurian and carboniferous rocks — limestones and quartzites. To the north of the abrupt bend in Bear River the lower grounds are covered with basalt flows, evidently originating from numerous craters still remaining in the vicinity. This outflow accounts also for the abrupt bend of the Bear River, since at this point a basalt plain is the only divide between it and the Portneuf, which flows into the Snake, a tributary of the Columbia; into which also the Bear once emptied, but now, reversing its course, flows into Great Salt Lake.

To the north of this region and of the great basin of the upper Green or Colorado River, the geology as well as the topography is more complicated, the country being exceedingly broken, and volcanic and eroding agencies having been active, both in long past and more recent times; but the studies of

Messrs. St. John and Endlich, to whom these districts were assigned, have solved many perplexing points, and their evidence will probably determine the relations of the principal stratigraphical phenomena to the main mountain chains, and enable us to form decided opinions concerning the geological age of the mountains themselves.

In addition to these parties covering definite districts, a fifth, under Dr. White, who has succeeded the late Mr. Meek as palæontologist to the Survey, was assigned a special duty, viz.: to endeavor to correlative the scattered stratigraphical observations which have been made by different parties on either side of the Rocky Mountain chain and of the Uintahs. With his party he therefore travelled in such directions as would enable him to examine the geological formations in their succession, so as to determine as far as possible the questions which have arisen concerning the limits of each, its correlation with the others, and to define its palæontological characteristics. Such a work must precede any rational classification of the different formations.

He first traversed in various directions the plains at the eastern base of the Rocky Mountains of Colorado between Cheyenne and Denver; he next crossed the mountains by way of Boulder Pass, the Middle and Egeria Parks to the head waters of the Yampa, and passed a short way down that stream. Crossing the divide between this river and the White, he followed the latter nearly to Utah, then turned northward and crossed the Green River at the southern base of the Uintahs, making many detours on the way, skirted the whole length of the Uintah Mountains westward, turned them by twice crossing the Wahsatch Mountains, and then followed their northern side back to Rawlins on the Union Pacific Railroad.

By this survey he has been able, as he believes, to show the identity of the lignitic series of strata east of the Rocky Mountains, in Colorado, with the Fort Union group of the Upper Missouri River, and with the great Laramie group of the Green River basin. The relative age of these beds has been a matter of long dispute among geologists, but the investigations of this year have proved their complete equivalence by the discovery

not merely of one or two doubtful species common to the strata at any one point, but by an identical molluscan fauna ranging through the whole series in each of these regions. He also finds the planes of demarcation between any of the Mesozoic and Cenozoic groups, from the Dakota or lower cretaceous to the Bridger or higher tertiary, inclusive, to be either indefinable or very obscure ; showing that whatever abrupt changes may have taken place elsewhere during that period, sedimentation was here probably continuous. While each of the groups of either series possesses its own peculiar palæontological characteristics it is also true that certain species pass beyond the recognized boundaries of each within the series.

While this ends our account of the regular exploring parties attached to the survey, it does not complete its activities. Under its auspices several parties have been making special investigations in the field. It is known to all of you that Sir Joseph Hooker and Dr. Asa Gray travelled extensively over the United States under the auspices of this Survey. To gain a general conception of the vegetation of the Rocky Mountain region, and of its relations to that of the rest of North America, they examined many parts of Colorado, Wyoming, Utah, Nevada and California, travelling in all some 9,000 miles. The results of their studies will appear in detail through the publications of the Survey, but they are already able to state that the vegetation of the middle latitudes of North America resolves itself into three principal meridional floras, far more diverse than those presented by any similar meridians in the Old World ; being in fact, so far as the trees, shrubs, and many genera of herbaceous plants are concerned absolutely distinct ; each of them is subdivisible into three. The first region comprises the Atlantic slope and Mississippi valley, and is subdivisible into an Atlantic, a Mississippi and an interposed mountain, or Appalachian region, with a temperate and subalpine flora. The second embraces the Pacific slope, and is subdivisible into a very humid, cool, forest-clad Coast Range ; the great, hot, drier California valley, formed by the San Joachin and the Sacramento flowing, the one north, the other south, into the bay of San Francisco ; and the Sierra Nevada, with a temperate,

subalpine and alpine flora. The vegetation of the third or Rocky Mountain region, comprising all the country lying between the two districts already mentioned, is subdivisible into a prairie flora, found principally along the eastern flanks of the Rocky Mountains proper; a desert or saline flora, covering the greater part of Nevada, Utah and Arizona; and a Rocky-Mountain-proper flora, temperate, subalpine and alpine. The Appalachians and the Rocky Mountains, therefore, severally divide the floras of their respective districts into separate east and west sections, while in the California district, a hot and dry valley effects a similar result by intervening between two parallel ranges of mountains. The difference between the Atlantic and Pacific floras is specifically and to a great extent generically absolute, not a pine, oak, maple, elm, plane or birch of eastern America extending to western, and genera of thirty to fifty species being confined to each. The Rocky Mountain region again, though abundantly distinct from both, has a few elements of the eastern region, and still more of the western.

Under the auspices of the same Survey, Prof. Joseph Leidy of Philadelphia made a careful examination of the country about Ft. Bridger, Wyoming, and of the Salt Lake basin, to study in life the fresh water Rhizopods of that region, in preparation of a work for the Survey upon the subject; and Mr. F. C. Bowditch of this city, and myself, travelled through much of Colorado and Wyoming, and a corner of Utah, making collections of recent insects, but especially in search of fossil insects, which were known to occur at various distant points in the Rocky Mountain region. Travelling most of the time, we made our longest halts at Green River, Wyoming and at Florissant, near Manitou, Colorado, in both of which places fossil insects are abundant in the tertiary beds. In the former locality, however, most of them proved so imperfect and indistinct as to be nearly useless for study; but at the latter we found a deposit, probably of miocene age, astonishingly rich in insect remains, many of them beautifully preserved. During the past year about 20,000 insects have been exhumed from this single locality, and scarcely an impression has been made upon the quarries, although perhaps more labor will hereafter be required in work-

ing them. In company with Prof. Lakes of Golden, we made as careful a survey of the basin in which they occur as our short stay permitted, and estimate the insect-bearing shales to have an extent fifty times as great as the richest localities known in Europe.

The Geographical and Geological Survey of the Rocky Mountain Region, under Major Powell, to which, from its departmental connection with Dr. Hayden's Survey, I next invite your attention, confined its operations the past season, almost entirely to the central portion of Eastern Utah, an area containing about 16,000 square miles, embraced between 38° and $40^{\circ} 30'$ N. Lat., and between $109^{\circ} 30'$ and 112° W. Long. Nearly the whole of this region is drained by the Green River and its affluents, before it unites with the Grand to form the Colorado, and is one of the most arid, inhospitable and inaccessible in the country; it is an elevated plateau, cut by a labyrinth of cañons and narrow gorges, and covered in many parts by hills of naked sand and clays. The western portion, however, includes broad valleys, abrupt ranges of mountains and one plateau of considerable extent, having an average elevation of 8,000 feet; the valleys, which contain large areas of excellent land, run north and south, separated by three ranges of mountains, rising in their highest peaks to 10,000–12,000 feet, and are drained by streams flowing westerly into Utah Lake.

With Pleasant City, a little town about one hundred and twenty-five miles south of Salt Lake City, as a base of supplies, three parties were organized, one for geodetical and two for topographical work. The triangulation was extended over the entire area selected; the work rests upon base-lines established in former years near Kanab and Gunnison, Utah, and was connected on the east with the triangulation points established by Hayden's Survey, and on the north with those of the Fortieth Parallel Survey under Mr. King. On account of the rumoured hostility of the Utes in a portion of the district (rumours which proved groundless), the triangulating party was united for a portion of the time with one of the topographical parties for mutual support; this party took the eastern portion of the field,

which is separated from the western at not far from $110^{\circ} 30'$ W. Long., and includes that part of Utah above 38° N. Lat., which lies east of the Green and Colorado Rivers,—in all about 10,000 square miles; they carried the secondary triangulation over this district with stations averaging ten miles apart; made a connected plane-table map of the whole and complemented the work with orographic sketches.

The second topographical party, occupying the western portion, were assigned an area more mountainous than that to the east, embracing about 6,000 square miles; in this they occupied topographical stations at average distances of about ten miles, and measured all the angles of nearly every triangle in the secondary extension; and, like the first party, made sketches and a plane-table map of the entire area.

Besides this purely topographical work, mercurial barometers were carried by each field party, and observations were made to connect every camp with the base station at Mt. Pleasant, where observations were made four times a day, and also hourly during eight days, in each month. All the geodetic points and topographical stations were also connected by barometric observations, either with the camps, the base-station, or both; the altitudes of all located points were also observed by the measurement of vertical angles.

This hypsometric work is deemed by the director of the Survey to be of the greatest importance in the classification of lands, and in determining the best methods of utilizing the waters of streams for irrigation. On account of its practical utility to the agricultural industries of the country, Major Powell suggests the establishment of a hypsometric base-line from Lake Michigan to the Pacific Ocean, from which lateral lines could be run to the base-stations used for each season. The methods of leveling, by which were determined the elevations of points along the Pacific Railway (now used as a general base), were not of sufficient refinement for present needs. The work requires great care and thorough discussion, and should be undertaken by the interoceanic geodetic connection of the Coast Survey. New tables also should be made, based upon series of observations in the Rocky Mountain re-

gion itself, at stations connected by careful leveling, both with each other and a determined base. Those now in use are founded on observations at somewhat distant points in Switzerland, under climatic conditions greatly different from those obtaining in the Rocky Mountains. Such a series of observations, however, would need to extend over long periods to attain the desired result.

Besides the three parties mentioned, separate geological investigations were carried on in other parts of Utah, by Mr. Gilbert and by a party under Capt. Dutton. The classification of lands occupied much of their attention. Mr. Gilbert traversed that portion of the drainage basin of Great Salt Lake which lies in Utah; it includes within its limits the most valuable land of the territory, as well as some of the most sterile, where the possibility of agriculture depends on the possibility of irrigation. By measuring the volumes of the streams, an attempt was made to ascertain the agricultural capabilities of the river valleys. Some of the smaller ones proved inadequate to serve the lands, otherwise arable, through which they run. East of the lake more than twelve per cent of the district is reclaimable; while west of it only a fourth of one per cent is of value for farming. It is also estimated that about two and one-third per cent of the whole territory of Utah can be redeemed by the utilization of the streams, but without the construction of reservoirs; and that one-third part of the irrigable lands of the Salt Lake basin is now under cultivation.

An investigation was also made of the climate of the district, as recorded in the rise and fall of Great Salt Lake. Until recently, no systematic record of its fluctuations has been kept, but from enquiry among the settlers it appears that the water is now much higher than formerly. From 1847 to 1850 it was low; then for five years it rose at about the rate of one foot per annum, afterward fell to its original level in 1861-62, and then continued to rise until 1868, when it reached its present height, ten feet above that first observed, which, with slight fluctuations, it has maintained ever since. Since the area of the lake is much greater with this increased altitude and the loss by evaporation correspondingly increased, the inflowing

water must be one-tenth part greater than formerly. Should it fall to its former level, it is plain that the possibilities of irrigation would be diminished.

It further appears by the studies of this geologist that the system of upward and downward movements by which the mountain ranges of the valleys of Utah and Nevada were produced, have continued down to the present time. Evidences of recent movements have been discovered on the lines of ancient faults. The old shore lines of Great Salt Lake, indicated by bench marks upon the surrounding mountains, are no longer level, but have been elevated or depressed with the displacement of the mountain masses; differences of nearly one hundred feet are found in the immediate vicinity of the lake, where the ancient shore lines lie a thousand feet above their present level; but the barometer indicates that the discrepancy is greater at more remote points.

The geological party under Capt. Dutton explored the plateaus drained by the Sevier River and its tributaries in Southern Utah, making a special study of the distribution of the eruptive rocks, and the methods and results of atmospheric degradation. Particular attention was also given by all parties to the extent of the forests, and the fact elicited that the area where standing timber is actually found is very much smaller than the areas where the conditions are such that timber should be growing spontaneously; — that is, the area of timber is but a small fraction of the timber region. Since the destruction of forests by fire greatly exceeds their removal for economic purposes, the best method of preventing these fires is an important problem.

In addition to these various labors, the Survey has been collecting with great care and pains most valuable ethnographic material, particular attention being paid to vital statistics, the discovery of linguistic affinities, the progress made by the Indians toward civilization, and the causes and remedies for the inevitable conflict that arises from the spread of civilization over a region previously inhabited by savages. It is believed that the publications of the Survey in this direction will have a peculiar value.

Passing now to the Geographical Surveys West of the One Hundredth Meridian, carried on by the Corps of Engineers under the immediate charge of Lieut. Wheeler, we find, as in all the other divisions of the Department of War, a system of reports based upon the fiscal and not the calendar year; so that information is not at hand concerning the whole of 1877, and our account of a year's work in any branch of this department must pass from July to July. In this period, between July, 1876 and July, 1877, Lieut. Wheeler reports that the fields occupied by him embraced parts of California, Nevada, Colorado, New Mexico, Utah, Idaho and Montana, besides Oregon, Texas, Arizona and Wyoming, but no further mention is made of the last four political divisions, and no details whatever are published concerning the Utah section of the Survey, which, during the first half of 1877, was to operate in Utah, Idaho and Montana. Consequently we must confine ourselves to the two sections, termed Colorado and California. Even of these the operations of 1876 only are available, and we are therefore practically considering the field season of 1876 in place of that of 1877. This was the season when Congress so long delayed action upon the appropriations, and consequently the parties were unable to take the field before the end of August or the beginning of September.

The Colorado section, organized at Ft. Lyon, in eastern Colorado, was divided into two field parties, each consisting of four skilled observers and four or five men employed as packers, teamsters, cooks, etc.; the executive officer acted also as field astronomer. The first field party made a circuit of South Park and passed through San Luis and Wet Mountain valleys, which are separated by the Sangre de Cristo Mountains, to obtain topographical data needed to complete certain sections of several sheets of the atlas preparing by the Survey. In an area of about 5,000 square miles, ten triangulation stations were occupied, at which repeated angles were measured by a theodolite reading to ten seconds of arc. Fifty-one topographical stations were occupied and located by angles to the triangulation stations. The route of the party was measured with the odometer throughout. At Colorado Springs a base-line,

12,000 feet long, was carefully measured. In addition to this, meteorological observations were everywhere taken, and mines examined on the west slope of the Sangre de Cristo Range and at Rosita in the Wet Mountain valley. Excepting the South Park, which is an elevated, broken plateau, the region covered by this party is one of lofty mountains and deep valleys, the latter for the most part narrow, with an abundance of timber, grass and water, and generally utilized for stock-raising.

The second party of the Colorado section followed up the valley of the Purgatoire to its head-waters, and crossing the divide surveyed first the head-waters of the Canadian River; then they crossed the Moro Mountains into the valley of the Rio Grande, and from this point, about Lat. $36^{\circ} 30' N.$, surveyed a belt of country on either side of the river, extending nearly due south to Lat. $34^{\circ} N.$ — an area of perhaps 5,000 square miles, a little above the middle of which lies the well known town of Santa Fé. In all, 7,000–8,000 square miles were completed, in accomplishing which, the party travelled 1800–1900 miles, occupied fifteen triangulation stations, one hundred and ninety-one three-point stations, and about fifteen hundred subordinate stations; on one peak, where, before an ascent could be made, they were forced to remain at timber line four days in the snow, over three hundred angular readings were made. The field astronomical instruments used were a sextant and artificial horizon; the topographical instruments an eight-inch transit, graduated to ten and capable of being read by a practiced eye to five seconds of arc, a seven-inch transit and two meandering transits; horizontal distances were measured by the odometer, checked by numerous three-point stations, the whole depending upon the triangulation points of the system developed from the base near Santa Fé, the coordinates of the extremities of which were astronomically determined in a previous year; the meteorological instruments were two mercurial and three aneroid barometers, with thermometers and hygrometers.

The Rio Grande, where the party struck it, runs for a distance of sixty miles through a basalt-capped cañon, eight hundred feet deep. Azoic rocks and carboniferous limestones

appear to occupy most of the territory surveyed, and everywhere evidence was found of old mines probably worked in former years by the Spaniards with Indian labor. The river is lined with towns, some of them containing 1500-1800 inhabitants, who bestow much attention to the cultivation of the grape.

The California section was organized at Carson, Nev., at the end of August and early in September, and divided into four parties, each of them equipped much as those of the Colorado section, and averaging five observers and three laborers. To one party, however, were attached two naturalists. With the exception of the fourth, each party worked over a comparatively narrow area, for the purpose of preparing the topography with considerably greater detail. The first party was assigned an area of about 700 square miles in a narrow strip, following the boundary line of California and Nevada, just north of the Central Pacific Railroad. Their field lay principally in the uplifted region which constitutes the Sierra Nevada Mountains, where they are of considerable breadth, and give the impression of a confused mass; observation, however, shows them to be composed of nearly parallel ridges. The summit line of the range is tortuous, but correctly located by the direction of drainage; the eastern wall is the true watershed, and about twenty-five miles west of, and nearly parallel to it, arises the second marked ridge of the Sierras; the field of operations lay in the valley between these eastern and western summits; they also surveyed a small stretch of country lying along the eastern base of the Sierras, and notwithstanding the elevation, they were able to continue field operations until the latter part of November. During the season, thirteen triangulation and forty-six topographical stations were occupied, several points were fixed by intersection, ten hundred and forty meander and aneroid stations, and ninety-four barometric were made, and the party travelled over eleven hundred miles, more than half of which was meandered.

To the second party was assigned the survey of Lake Tahoe and the neighboring country, including an area apparently about as large as that assigned the first division, and one of very picturesque beauty. This lake, well known to tourists,

covers about 188 square miles, and is situated in a lovely wooded country high up in the Sierras, at an elevation of 6,200 feet; but the ruthless demands of the neighboring mines have nearly despoiled its slopes of their verdure. In this mountainous district, the party travelled over a thousand miles, of which more than half was meandered. Few sextant latitude observations were required, as every important point could be fixed by triangulation, seven main and fourteen secondary triangulation stations were occupied, 834 stations were made on the meander line, and 102 three-point stations as checks, or for location. Over one hundred barometric observations for altitude were also made.

To this party were attached a naturalist and a geologist. Mr. Henshaw gave his special attention to birds, and publishes two lists, enriched with many notes, one of seventy birds about Carson, which are quite like those to the eastward; and one of one hundred birds occurring on the eastern slope of the Sierras. He finds that as soon as the plains and low open valleys are left, and the foot hills ascended, one encounters a somewhat abrupt change in the avifauna, which increases in significance as far up as the pine region, where the preëminently mountain forms are abundant. He therefore considers the eastern slope of the Sierras as belonging to the Pacific province,—a conclusion, it will be noticed, practically the same as that reached by Drs. Hooker and Gray in studying the vegetation of the same region.

Mr. Conkling furnishes reports on the geology of Carson Valley, Lake Tahoe, and the eastern and western summits of the Sierras, between which lies the lake. Nearly all the region is covered by granite, with occasional outbursts of volcanic rocks. Fossils were found in only one locality; this is in the Carson valley, the greater part of which belongs to the quaternary, and near which, in El Dorado Cañon, is a bed of tertiary lignite, which has found a ready market in the neighboring mining region. Lake Tahoe is one of the largest fresh water lakes in the west, and probably the deepest in the United States, reaching in some places the depth of 1,645 feet; although hot springs occur along its shores, the water is exceedingly cold and clear; in one of the deepest parts occurs a

deposit of diatoms. The crest of the eastern summit of the Sierras consists, at this point, entirely of granite, flanked in several places by igneous rocks, which usually form spurs of the range. On the western summit, the predominating rock is granite, but igneous rocks have broken through it in several places. This ridge has been the centre of enormous ancient glaciers, which Professor Joseph LeConte has studied with much care; erosion and denudation have occurred upon a large scale; the slopes are often covered with debris, and precipitous walls give the gorges a very picturesque grandeur. There is a striking contrast between the two sides of this range, the eastern slope toward Lake Tahoe being mostly bare and rocky, while that facing the west is densely wooded.

The duties assigned to the third party were to lay out, measure and develop a base-line in Carson Valley, and then to commence work on a detailed map of the country embraced by the mining interests of Virginia City and the neighboring district. The base-line was laid out on a very straight portion of the old emigrant road, and was connected with the astronomical station established four years ago at Virginia City. The difference between two measurements, after applying all corrections for error, was .0347 of a foot, or about one-third of an inch, in a distance of about four miles and a half. The country mapped by the topographers includes Virginia City and the northern portion of the Comstock Lode, and some districts to the north and east, an area of about 125 square miles, containing the richest mines of gold and silver known to the world. Since Mr. King of the Fortieth Parallel Survey wrote his report on the geology of the Comstock, the region then considered unproductive has developed an extraordinary richness, the Consolidated Virginia mine alone yielding in 1875 the enormous amount of nearly \$17,000,000 from about 170,000 tons of ore. Exploitation is still going on, and the horizontal limits of pay-ground are far from being determined. One of the difficulties encountered has been a sudden influx of immense bodies of heated water, which powerful pumps cannot exhaust. It is hoped that the famous Sutro tunnel, which will

tap the Comstock at a depth below the surface of about 1900 ft. may facilitate the removal of the water by the use of the same machinery which now makes no permanent headway against it. Six months ago this tunnel had reached a length of 17,500 ft., and was still about 2,750 ft. from the lode; but at the rate of speed it has been advancing, should reach the vein in two or three months from the present time. The last seven or eight years has been the period of greatest activity and change the Comstock Lode has known. The mines have been opened a thousand feet deeper, and, in correspondence with an alteration in the dip of the vein, have changed from a vertical to an inclined system of working. These changes induced Lieut. Wheeler to make a minute survey of this region, including underground examinations along profile lines one hundred feet apart and plotted on the scale of five hundred feet to the inch, to supplement the admirable work in this same district formerly made by Mr. Clarence King.

The fourth party, both in organization and the extent of its field resembled more the Coloradan parties than those of its own division. It consisted of four observers with four workmen; and its territory lay directly to the east of the others, and included about 5000 square miles—a desert country, bounded on the east by the Toyabe Mountains, traversed by several parallel ranges of lower hills, and including the Humboldt Desert and several sinks and sloughs, where the scanty waters of this interior basin disappear. The party travelled 1700 miles, more than half of which were meandered, occupied twenty-two primary and seventy secondary stations, besides two hundred and forty-four three-point stations, made observations with the aneroid barometer at five hundred places, and with the mercurial at more than one hundred, took twenty-seven observations on Polaris to determine the magnetic variation, and determined the latitude by the sextant at thirty points; they also visited and examined the mining districts about Austin in the eastern part of their area.

An important feature of the present stage of Lieut. Wheeler's survey is the preparation of colored sheets indicating the extent of arable, irrigable, grazing, mining, timber and desert

lands; the direction of drainage, with basin perimeters, will also be added, with the amount of rain-fall so far as known. These, with the data upon which they are founded, will furnish good material for deciding upon the feasibility of irrigating by canals, reservoirs and wells.

I think no one can have listened to this digest of one year's operations of the great national surveys without feeling a regret that their continuation hangs on such a slender thread as an annual appropriation by Congress. Admirably designed to meet a positive want, and admirably conducted by able and energetic chiefs, they still need a better recognition as necessary departments of governmental bureaus, that the work may proceed to completion. There is also, under the present system, more or less duplication of work, which is to be deplored, and which, under more systematic organization, would be avoided. Many plans have been proposed to harmonize the work and we may hope that in due time Congress will establish the surveys upon the permanent footing which their importance demands, and through which alone we can look for the best results. But in any case we must admire the energy and be proud of the achievements even now secured, and congratulate the surveys upon their distinguished success.

Returning from this slight digression let us notice what is doing in other branches of the Engineer Department.

The field-work of Mr. King's Survey of the Fortieth Parallel was finished several years ago. The office work still continues but will soon be completed. The entire publication will consist of seven quarto volumes and an atlas, all of which have been published, with the exception of the first volume, on Systematic Geology, by Mr. King, the manuscript of which is ready, and the last, on Vertebrate Palaeontology, by Prof. Marsh, which it is hoped will be finished the present year.

In the military department of Dakota, some attention has been given by the Chief Engineer to topographical work in the field, and the collection of geographical and geological information; this was particularly the case in the expedition against

the hostile Sioux in the summer of 1876 ; this expedition moved westward from Fort Abraham Lincoln on the Missouri, to the Yellowstone and Big Horn Rivers, and returning, went to the relief of Major Reno after the discomfiture of General Custer.

In the department of the Platte, reconnaissances have been made following half a dozen routes through unoccupied or partially occupied country, principally centreing upon Ft. Fetterman, Wyo., on the north fork of the Platte, and in all aggregating 500-600 miles. The longitude of Ft. Fetterman was determined by telegraphic time signals exchanged with Detroit ; and meteorological observations have been taken during several months at Fts. Fetterman and Laramie.

From the military department of Missouri a survey was undertaken of the sources of the Red River of Texas. The route of the party lay from Ft. Elliott in northern Texas, directly across the numerous forks of the upper waters of Red River and back again. A stadia-line was run the whole distance, the meridian determined when practicable at each camp by a portable transit ; and from the line so established the azimuth of the course was taken by the theodolite and preserved by back sights on the march. Sketches, geological notes and meteorological observations were also taken, and some meagre collections in natural history were made. The botany has been reported upon by Drs. Wilcox and Wood, the insects by Mr. Strecker, and the geology by Lieut. Ruffner of the Engineers, who conducted the exploration.

The Survey of the Great Lakes and of the Mississippi River is also under the charge of the Engineers. The reconnaissance for primary triangulation has been extended from Cleveland, Ohio, to the west end of Lake Erie, and the readings of the angles of this triangulation has been continued from Painesville to Cleveland ; a beginning has also been made upon the triangulation which is to connect Lake Michigan and Lake Erie, stations having been erected for one hundred miles east from the southern end of Lake Michigan. At the same time the topography and hydrography have been carried from Vermilion, Ohio, to the western extremity of Lake Erie, and the

measurement of a primary base-line with the new Repsold apparatus begun at Summit, Ill., was finished last summer; astronomical work has also been continued at the observatory of the Survey at Detroit, in determination of points in aid of the State Survey of Michigan. Observations have been made to determine the height of the lakes. For this purpose a line of levels of precision has been run independently, in duplicate, from Escanaba, at the north end of Green Bay, to Marquette, on the adjoining shore of Lake Superior, a distance of sixty-five miles. The two lines, on reaching Marquette, differed by 31.4 mm., and at no point was the difference greater than 41.8 mm. The highest elevation above Lake Superior which the lines traversed was one hundred and ninety metres. The resulting height of the mean surface of Lake Superior above that of Lake Michigan is 6.249 metres or 20.5 feet; in a similar way the line from Lake Erie to Lake Huron has been leveled, and a preliminary reduction gives the height of Lake Superior above mean tide at New York as 602 feet. Water-level observations have been continued at two stations each on Lakes Ontario, Erie and Michigan, one each on Lakes Superior and Huron, and in the straits connecting Lake Huron with Lake Superior on the one side and with Lake Erie on the other. Six lines of soundings have been carried across Lake Erie, besides many shorter lines to complete the hydrography, for which, to mention one only of many details in this branch of the work, over 40,000 casts of the lead are reported.

The extension of the Survey to the Mississippi was begun in November, 1876; its object is to construct a good map of the river, and to obtain data for any improvements needed in its navigation, and for the location of levees. The party undertaking it was instructed to base the topography on a secondary triangulation, so that the work might be the reliable base for all future partial surveys; to erect numerous permanent stone marks, determined in position and height; to run continuous lines of level along the river bank, and also back from the river once in each mile, so as to locate contour lines for every three feet of elevation. The Survey was begun at Cairo, Ill., and pushed southward for fifteen miles; a base line, a little over a

mile in length, was measured, and from it the triangulation was carried about seven miles, fourteen stations being occupied; the topography was carried back one mile from the shore line. Permanent reference marks were set in three straight lines across the river, five or six miles apart, each consisting of two stones on either side of the river, placed respectively one and three half-miles from the river bank. From old surveys made by the Government in 1809-10, it appears that portions of the banks have been washed away to the depth of nearly half a mile. The character of the bottom of the river was carefully examined, and borings made near Cairo to study the old bed. A line of levels of precision was also run from Cairo to Columbus, Ky. During the past summer the work has been carried on simultaneously at Cairo and at Memphis, and the latitude and longitude of both these places have been determined.

During the year the Survey has occupied thirteen primary and fourteen secondary triangulation stations, completed 159 square miles of topography and 133 square miles of inshore hydrography, and developed 204 miles of shore line. Latitudes of three and longitudes of nine places have been determined. Since 1852 it has issued fifty-six charts or scales, varying from 1 : 5,000 to 1 : 40,000, of which five were published during the past year.

This completes the account of surveys carried on under the War Department. Turning now to the Coast Survey, which is under the direction of the Treasury, and which has by far the most complete organization for surveys of large extent and great precision, we find that its regular work was prosecuted during the past year with its accustomed energy, although Congress had greatly curtailed the appropriations in a misdirected attempt at economy in public expenditures. On the Atlantic coast the survey now presents a continuous chain from Mt. Desert to Cape Canaveral. During the year progress has been made in pushing the topography eastward in Maine and southward in Florida; off-shore soundings have been obtained in both regions, and local resurveys have been made of entrances where important changes had occurred.

The fact that so many of our harbors are barred by sands or are encroached upon by silt, demands a constant watch over the channels leading into important seaports, and no inconsiderable means are annually devoted to this end. For New York harbor, the entrance to which is formed by narrow channels scoured by the ebb current through a cordon of sands, an annual examination is found necessary. Philadelphia, Baltimore, and Beaufort, N. C., have likewise had special surveys during the past year. An interesting examination of the salinity of the waters of Chesapeake Bay and its estuaries has been made, with a view to a study of its general regimen, and as bearing upon the important question of oyster culture. But to us the most interesting part of the work, during the past year, on the Atlantic coast, is the closing of the chain of fundamental triangles extending along the southern portion of the Appalachian mountains, and completing a continuous geodesic arc from Passamaquoddy Bay to central Georgia. This work, with its five base-lines and numerous determinations of azimuth, latitude and longitude, not only furnishes an exact framework for the survey of the states through which it passes, but is an important addition to our data for determining the figure and magnitude of the earth. The numerous elevations determined of peaks in the Blue Ridge and Alleghanies between Harper's Ferry and Atlanta, fall specially within the province of our Club.

Pursuing our review of the work around the shores of the Gulf of Mexico, we find the survey completed from Cape Florida to the Tortugas and Cape Sable; some long reaches are yet to be mapped between the latter point and Cedar Keys, on the west coast of Florida, but from this point to the Mississippi Delta the survey of the shores is unbroken; west of this there are again several breaks, until we reach Galveston, whence the survey is again complete to Corpus Christi; off-shore soundings are however still wanting along a portion of the coasts just cited. Deep soundings have been taken most successfully in the Gulf, developing the form of this great basin, and by the aid of temperatures at all depths its regimen and

circulation. Work has been in progress from Tampa Bay southwards, in the vicinity of Cedar Keys, on Barataria Bay, from Corpus Christi towards the Rio Grande, and on the Mississippi River, northward from New Orleans. The latter work has a special value in connection with the question of securing the banks from overflow, and will be vigorously pressed, a fresh point of departure having recently been taken near Helena, Arkansas, whence the survey will be carried to the head of ship navigation, and will be met near Memphis by a trans-continental chain of triangles of which I shall presently speak.

On the Pacific coast the survey has been in progress in southern California, especially on the Santa Barbara channels and adjacent islands, a work rendered very difficult and slow of progress by fogs and haze; also north of Point Conception, above Cape Mendocino, on the coast of Oregon, on the Columbia River and in Puget Sound. Very noteworthy is the occupation of Mt. Diablo and Mt. Helena, peaks of the Coast Range, as the westernmost stations of the great trans-continental chain, and the observation of angles upon stations in the Sierra Nevadas, forming some of the largest triangles ever observed, and clearing at a single step the interval between the Coast Range and the Sierras, one of the diagonals in the quadrilateral being one hundred and sixty-two miles long. This is part of a general scheme for uniting in one system the Atlantic and Pacific coast triangulations, which about five years since was authorized by Congress; and here good progress has been made, not only by the requisite reconnaissance, but by actual triangulation.

On the southern branch of this trans-continental triangulation, the work has been actually executed from Atlanta across Georgia and Alabama, and laid out to the vicinity of Memphis. On the northern branch the scheme has been perfected to the Ohio River, and from a central point near St. Louis the triangulation has been carried westward half way across Missouri, while the reconnaissance has been extended eastward across Illinois. Numerous interior positions have been accurately determined in latitude and longitude, by astronomical observations, and a line of levels of extreme precision be-

tween the two oceans begun. In authorizing this work Congress provided that by furnishing the general triangulation, the aid of the Coast Survey organization should be given to those states that have provided for a topographical survey of their area. Under this provision triangulation has progressed in the states of New Hampshire, New Jersey, Pennsylvania, Tennessee, Kentucky, and Wisconsin. It is to be regretted that all this work, looking directly toward a comprehensive scheme of a general trigonometrical survey of the whole country, has been interrupted by the failure of the last Congress to provide any means for its prosecution.

We cannot leave the Coast Survey without adverting to its perfect and beautiful maps, its Coast Pilot, its tide-tables published annually, and its magnetic charts; but any particular enumeration of these and other matters would carry me too far away from my present purpose.

Last spring the Government instituted, under the Department of the Interior, an Entomological Commission, whose special object was to make a thorough examination into the locust evil, and suggest remedies. Messrs. Riley, Packard and Thomas were appointed, and divided between them the possible locust area, or the region west of the ninety-fourth meridian. Mr. Riley chose for his examination the southern half of the district east of the Rocky Mountains, that is, south of Denver, or the Fortieth Parallel; also the western part of Iowa, and, conjointly with Dr. Packard, British America. Dr. Packard took also the entire region west of the Rocky Mountain Range; and Mr. Thomas the district east of it lying north of the Fortieth Parallel. They hope to arrive at a complete understanding of the nature of the breeding places of this dreadful scourge, the natural limits of its distribution east, west and north, the area of its past invasions, the exact nature of its migrations, and what species it is which is injurious upon the Pacific coast. They will also make experiments to determine the comparative value of preventive measures.

The Commission was appointed late in March, and early in April Mr. Riley was on his way to Texas. In May and June

he visited Kansas, in July, Colorado, in August and September, Ontario and Manitoba. Mr. Thomas made several visits to Nebraska, Minnesota and Iowa. Dr. Packard chose the westernmost field and made two journeys. On the first he went to Colorado, Wyoming and Utah, then turned north through Eastern Idaho and Central Montana to Ft. Benton, and followed the Missouri 1200 miles to the western limit of the Northern Pacific Railroad. On his second trip he travelled directly to California, and from Sacramento went by way of Shasta Valley and Portland, Oregon, to Wallula on the Columbia, and then north through Washington Territory to the British Boundary, returning to California by sea. The Commission therefore covered in a cursory way the entire territory, securing a general view, which future seasons may enable them to fill to better advantage. The district examined by Dr. Packard was the newest, and in some respects the most important; on his first journey he collected data tending to prove that the breeding ground of the locust (*Caloptenus spretus*) includes a vast region between Long. 102° W. and the Rocky Mountains, and even extending beyond them in certain parts of Montana. On his second journey he found he must place the limits of its range much further, so as to include almost the entire country between the Rocky Mountains and the Sierra Nevada; and the general result of his studies seems to be that the permanent breeding grounds of this locust extend in one direction across the entire breadth of the United States, and even pass northward to the Upper Saskatchewan; and in the other, reach from the Sierra Nevada to the limits between plain and prairie east of the Rocky Mountains. If this be true, the district outside their breeding grounds which they periodically invade, is a belt of country lying east of it, about five degrees in width, and less than half as large as their natural territory.

The results attained by the Commission during its first year show conclusively the wisdom of its appointment, and lead us to believe that it will be continued until the complete history, habits and distribution of this insect are known. Only in this way can we expect to cope with so terrible an enemy.

The only other Government Commission coming within our field is that of Fish and Fisheries, and of this it is simply necessary to say that with its headquarters at Salem, in this State, it covered its usual routine of research in marine zoölogy and ocean physics on the coasts of Massachusetts and Nova Scotia.

In this connection, however, mention should be made of the Smithsonian explorations, on account of the intimate relations of this Institution to the Government. Since the inauguration of the territorial surveys, the Institution has withdrawn from the field to some extent, but still continues certain work, particularly in ethnology. Mr. E. W. Nelson, for instance, nominated by the Institution to the Signal Office, is now stationed as an observer at St. Michaels', Norton Sound, where he is engaged in making extensive collections and observations in natural history. His predecessor, Mr. L. M. Turner, who has been at that place for three years, has just returned with large collections of the ethnology and natural history of Alaska. Rev. Stephen Bowers of Santa Barbara, Cal., has lately completed extensive ethnological explorations in his neighborhood and in the adjacent islands of San Miguel, Santa Rosa, etc., the same field in which Mr. Schumacher has been working with such success. Dr. J. F. Bransford of the Navy has spent several months in Nicaragua and Costa Rica, collecting objects of prehistoric age, embracing many hundred vases and other articles of terra cotta and stone.

Let us now glance at one or two of the State Surveys.

Less than two years ago the State of New York appointed a Board of Commissioners of a Trigonometric and Topographical Survey, with Mr. J. T. Gardner as its Director. Mr. Gardner has had long experience in western surveys under Messrs. Whitney, King and Hayden. With a small appropriation, the primary triangulation, starting from one of the U. S. Coast Survey triangles on the Hudson River as a base, has been extended this year over an area of about 3000 square miles, including parts of eleven counties, in which one hundred and seventy points have been located. Five primary stations have been occupied and three more observed upon. The average

length of the sides of the triangles is about twenty-eight miles ; all the angles were observed by Mr. Gardner himself, with a twelve-inch circle reading to tenths of seconds by three micrometers. The preliminary computations show that the errors of closure in the triangles do not exceed those of the principal surveys of Europe and this country. The secondary and tertiary triangulation has also been extended over about 1700 square miles of the same district, including the greater part of five counties immediately west and northwest of Albany. Within this area almost every town, village and hamlet, as well as points a few miles apart along the important roads, have been located. 175 miles of county boundary, including the whole or parts of nine counties, have been marked with granite monuments four feet high, and the position of a large number of them has been fixed trigonometrically. A map of this region will soon be constructed. The local surveyors have already begun to base their surveys of private property on the state triangulation, and deeds are already on record, in which the position of the land is described, by giving the distance and direction of the nearest survey monument, the use of the needle being abandoned. Thus early does this last of our surveys bear practical fruit. When we consider that this survey unquestionably sprung from the agitation in our own state for a similar object, we may at least console ourselves on so much good accomplished outside our limits, and hope that its success may before many years spur to emulation a state which should lead and not follow, whose greatest need at the present day is a good topographical map of its own territory, one-third of which is already covered with the net-work of the Coast Survey triangles.

Very little field-work has been undertaken the past season in the Second State Survey of Kentucky, under Prof. N. S. Shaler, but progress has been made in the publications. The first four volumes of the economical reports are completed, the fifth and sixth each about half done, and matter enough has accumulated for the completion of the unfinished volumes. These volumes contain over fifty memoirs on the various re-

sources of the Commonwealth. A first volume of scientific memoirs has been published and a second commenced; two volumes of photographic views are also ready for the press. Chemical analyses of over six hundred different samples of the products of the state have been made. Biennial appropriations are made for the continuance of this Survey, which has now been in operation six years.

Pennsylvania also has its Second Geological Survey, under the direction of Prof. J. P. Lesley, which practically commenced work in June 1874, with appropriations providing for its continuance until the close of next year. Prof. Lesley has kindly given me so admirable a digest of its operations, that I venture to lay it before you in very nearly his own words; a small part of it has reference to the earlier as well as the later years of the Survey, but it will be none the less interesting on that account.

The state was not regularly divided into districts, but the least known portions were surveyed first. Five district surveys were organized: one in the azoic rocks; one in the lower silurian iron-ore limestone belt; one in the upper silurian fossil ore belt, taking in the ore belt of the lower devonian; one in the oil field; and one in the bituminous coal field. Afterward two other districts were occupied; one that of the Chemung rocks of the northern counties, and another in the bituminous coal field.

Gradually the number of independent assistant geologists was increased, so that in 1877 Prof. Stevenson, Prof. White, Mr. W. G. Platt and Mr. Ashburner have surveyed separate parts of the bituminous coal area. Mr. Carll and Mr. Chance have together continued the survey of the oil region. Mr. Sherwood has made colored outcrop maps of three northern counties in addition to three previously made. Mr. Franklin Platt has finished Blair County. Mr. Chance has finished a large contour-line map of the upper Juniata limestone region. Mr. Billin has half finished a large contour-line map of the Buffalo mountains. Mr. Sanders has nearly half finished the contour-line map of the South Mountain range. Mr. Berlin,

under the direction of Prof. Prime, has finished the limestone belt iron-ore map as far west as Reading, and commenced the contours of the mountains between the Delaware and Schuylkill Rivers. Prof. Frazer has finished a survey of Lancaster County. Mr. Sanders has laid in the outcrops of Cumberland County, and Mr. C. E. Hall and Mr. Fellows have made large collections and traced outcrops along the Philadelphia belt of azoic rocks.

No changes have been made in the personnel of the corps since its organization. The work is harmonious, the members zealous and the results large, some of them new and unexpected; but in the main the accuracy of the old survey of 1835-41, under the Brothers Rogers, has been satisfactorily established.

The function of the new survey is one of differentiation and precision. The contour-line maps, on a large scale, based on a reticulation of transit and level work, are its best illustration. A multitude of connected, measured, vertical sections throughout the bituminous coal field and oil region, will leave nothing to be desired there in the permanent stratigraphical definition and classification of the coal measures of the state. A new and brilliant light has thus been thrown upon the geology of coal. Another year's work will give nearly all that is needed on the subject of glaciation. Nothing whatever has yet been done in the anthracite field. The materials for it, accumulated by the railroad and coal companies, are beyond calculation, and only need collation and publication to make such a survey complete.

Thirteen octavo volumes of the survey have been printed and distributed; two more will be published in a few days, and three others are going through the press. Two volumes are ready for the press and will soon be in hand, and ten volumes will be prepared this winter for printing in the spring of 1878. With the exception of three volumes of chemical analyses, one of oil-well records, one of railway and other levels, and one, by Prof. Lesquereux, on the flora of the coal, these thirty volumes form a library of local county geological reports. Exhaustive indexes, geologically arranged, give them, however,

a scientific value. The county maps published with them will be followed by a small pocket atlas of colored geological county maps of the state.

The only object of the present survey is to put the geology of Pennsylvania within reach of every citizen of the state. If geologists find new knowledge in its publications, it is clear gain; for they are not written for geologists, but for the common people of Pennsylvania. Accuracy and completeness are the only desiderata kept in view.

The Geological and Natural History Survey of Minnesota, though small in proportion to the preceding, possesses an independence of political influences and a stability, which makes it particularly worthy of our attention. It has just completed its sixth year, and is established on a secure, though small financial basis, being under the supervision of, and making its reports to, the Regents of the State University; it seems destined to do a good work for the state, so far as the geology and kindred sciences are concerned, but the only basis for its topography appears to be the determination of the latitude and longitude of certain points through the assistance of officers of the U. S. Lake Survey.

Detailed geological surveys have been made in 1877 in Ramsey, Rice, Pipestone and Rock Counties, and preliminary surveys in Goodhue, Wright and Morrison Counties, as well as along the line of the Northern Pacific and St. Paul and Duluth Railways. A careful investigation has been made of the domestic water supply in the Red River valley. The famous pipe-stone quarry has been described and mapped. Palæontological and chemical studies have been carried on in the laboratory, and the ornithologist and entomologist have been active in the field; the latter has made valuable observations on the ravages of the destructive locust.

The following are the most important results of the year: Evidence has been obtained by Prof. N. H. Winchell, the geologist in charge of the survey, indicating the presence of upper Trenton strata in Ramsey County, where its lithological and palæontological characters bear so close a resemblance to those

of the typical Cincinnati group, as to suggest that the term Cincinnati may elsewhere have been wrongly applied to true Trenton limestones. The shaly condition of the rocks is believed to be due to the greater proximity of the old azoic axis of the continent, causing coarser sedimentation.

A study of the more recent deposits shows that in the southwestern part of Minnesota, the loess loam enters the state from the south, becoming gradually coarser in going north, with gravel stones and pebbles, until it passes into a stony clay, and at last into a true boulder clay, apparently continuous with the later boulder clay of the drift period. This would show the loam of the great rivers and lake-valleys of the west to be simply the drainage from the vast drift accumulations formed further north at the time of the last glacial epoch.

The investigation of the drinking water in the Red River valley was made because it had been feared that the noxious odors which prevail in wells sunk in this district, and which had proved disastrous to the health of the inhabitants, was due to the nature of the soil itself, and would always render the region unhealthy. It was found that the trouble extended over the whole western prairie portion of the State, and was simply due to the persistent use of pine plank in walling the wells. Stone having to be brought from a distance, the early inhabitants have naturally taken the most available timber; and since the drift in which the wells are sunk is a tight clay, the decay of the sap and pitch of the wood has been confined to the water, instead of being carried away by easy drainage and gravelly subsoils.

This by no means exhausts the number of states in which surveys of one kind or another, principally geological, are in operation. Alabama, Georgia, Mississippi, North Carolina and Tennessee in the south, Indiana, Michigan, Missouri, New Jersey, Wisconsin, Rhode Island, and perhaps Kansas, in the north, all have persons employed with a larger or smaller force, with or without pay, making regular or occasional reports to Legislatures or Boards of Agriculture; probably the number could be increased. And surveys on a somewhat extensive

scale have just been completed in New Hampshire, Ohio and Illinois. In most cases, however, those surveys now in progress have mainly a local interest, and I have not therefore attempted to obtain special information concerning them.

There have also been a few private explorations of some interest, although during the past year comparatively little has been done excepting by the Peabody Museum of Archæology at Harvard College. Under the auspices of this new institution, Dr. E. Palmer spent ten months in southern Utah and northern Arizona exploring the ancient mounds; these are not such as have been used for burial, but appear to be formed by the successive ruins of mud houses, one house being built upon the leveled heap which the ruins of an earlier one furnished, and in its turn giving place to another when the first has been leveled by atmospheric agencies; they are therefore mounds of residence or ancient dwelling sites, and a considerable variety of curious pottery has been found in them; similar pottery was found by Dr. Palmer in some rock-caves in the same region, and both are probably to be referred to the old Pueblo race. Dr. Palmer also made zoölogical and botanical collections of considerable interest, coming as they do from regions seldom visited by naturalists, discovering a number of new plants and insects. He has recently gone, in the interests of the Museum to Mexico, accompanied by Dr. Parry, who will devote himself to botany.

Mr. Paul Schumacher has been exploring the island of Santa Catalina, off the southern coast of California. He has made some interesting discoveries concerning the manufacture of large stone pots, which, until the arrival of Europeans, or before 1650, the Indians made from steatite. He has found them in all stages of manufacture, and has even discovered the place whence they obtained the steatite. He also explored their burial places.

Mr. Henry Gillman has been engaged in the same work in the burial mounds of Florida, but no returns have yet been received.

Dr. C. C. Abbot has continued his examinations of the drift-

gravel of New Jersey with most interesting results, bringing to light what is deemed conclusive evidence of the existence of man on this continent during the glacial epoch; in gravel acknowledged by Hunt, Pumpelly and Shaler, to be either of glacial or interglacial age, he has found a large number of stone objects, unquestionably fashioned by artificial means; the discovery of implements in so many places where their presence cannot be referred to mere accident, leaves no doubt in the minds of those who have examined the evidence that the conclusion of Dr. Abbot is essentially correct.

Finally, the Curator of the Museum, Mr. F. W. Putnam, spent a portion of last summer exploring the mounds, stone graves and earthworks of Tennessee; he believes he has obtained conclusive proof that the localities, so frequent in the west, surrounded by embankments of earth upon an extensive scale, were sites of villages, the embankments being purely protective. This is opposed to the views of Morgan, who maintains that the village houses were built upon the encircling mound and opened into the common area, where vegetables were grown. As relics of the mound builders, Mr. Putnam brought home a large collection of skeletons, pottery, stone implements, pipes, and various articles of shell and bone. Seven perforated pearls were also found, and four copper articles. Parties are still in the field, extending these explorations.

I have to speak of one more expedition, which, though it is more or less familiar to you all, and has nothing to do with our own territory, has as little to do with that of any other country, and possesses an interest peculiar to itself. I refer to the North Polar Expedition, organizing by Capt. Howgate of our army. His plan is to establish a colony of fifty men, under military discipline, including three commissioned officers, two surgeons, an astronomer, and two or more naturalists, upon some point north of the 81st degree of latitude, on or near the shore of Lady Franklin Bay; to provision this party for at least three years, sending them annual supplies and recruits, and thus to make the colony the base of expeditions toward the pole. This

differs from preceding plans in leaving the party with no means of return until their work is accomplished, the only use of the ship being in transporting the men and supplies. They are to burn their bridges behind them. The advance to the pole is to be made with dog-sledges, and the men are to live like the Esquimaux.

This plan would certainly merit our heartiest commendation, did it not overestimate the importance of one single point — reaching the North Pole. “From the post so formed,” says Capt. Howgate, speaking of his proposed colony, “no time will be spent in needless quest along the shore, either east or west”; the colony will “have their work narrowed down to a common focus — the pathway due north.” This is certainly a fatal error. It is of little consequence to geographical or any other science, whether the pole is ever reached, however much the stimulus of adventure toward the pole may be needed to tempt men to explore high latitudes. But the knowledge which may be accumulated through such a colony by explorations in *every* direction, would be of incalculable value, and under proper direction might form an addition to our knowledge of geology and terrestrial physics such as could never be gained elsewhere. Nowhere else can we so readily study the phenomena of the glacial epoch, the influence of which still shapes our lives and modifies all our surroundings. In no other quarter of the globe, as Prof. Loomis has pointed out, can we make observations on the phenomena of magnetism, of atmospheric electricity, of the currents and varying temperatures of the air and water, which would possess so much importance in solving meteorological and other problems; while as to geography proper, nothing whatever is known of that region but the bare shore line, and even that is fragmentary. So far, then, from its being true that “Surveys there have already been completed,” as Capt. Howgate urges, there is no quarter of the globe where more work is demanded, or where the result could be turned to better account; and Capt. Howgate’s plan must be placed upon a broader basis, if the expedition would expect to compete in any way with those fitting out by other nations.

The faith of many persons in the ultimate approval and support of Capt. Howgate's plan by Congress, has led them to fit out a preliminary Arctic expedition, to prepare the way for the main party, which it is hoped will organize the present year, and reach the Greenland coast by the middle of August, at latest. This preliminary party sailed from New London in the *Florence*, a schooner of fifty-six tons, on the 2d of August, and reached Cumberland Gulf on September 13th. Advices from them at the end of September announce their intention of moving at once into winter quarters at the head of the Gulf near Lat. 67° N. The party consists of thirteen persons, including a meteorologist and photographer, Mr. O. T. Sherman, and a naturalist, Mr. L. Kumlein. They are expected to bring together ten Esquimaux families, with their dogs and sledges, and fur clothing sufficient to supply fifty persons for three years, with other stores, in readiness for the main party next year. They will also make meteorological observations and collections in natural history. When, next year, they have turned over the colony's outfit to the new party, they expect to capture and bring home a cargo of bone and oil, sufficient to defray a part, at least, of the expenses of the trip. Notwithstanding, then, the failure of Capt. Howgate's plan before the last Congress, we have an American party, with scientific men attached, stationed this winter within the Arctic Circle.

I will now only detain you for a few closing words. The activities of our Club during the second year of its existence, and the increasing number of those who are attaching themselves to its fortunes, prove beyond a doubt that the interests of the Club have a firm hold upon the community, and that its existence answers to a real want. Its future is therefore assured; but I would venture to suggest that we should now obtain an act of incorporation. Without this we can neither expect the largest success, nor those benefits which our patrons may at some time be inclined to grant. With it we may confidently anticipate the steady growth and increasing popularity and usefulness of our young but vigorous institution. The happy blending of science and art, of pure exploration and

scientific geography, in its organization is one guaranty of success, and exemplified as it is in the choice you have just made of my successor, I gladly resign to him a chair which he will fill more worthily and gracefully than I, securing for himself the same hearty support which it has been my favor and indulgence to receive at your hands.

Glacial Markings among the White Mountains.

By C. H. HITCHCOCK.

Read July 24, 1877.

No part of the area occupied by the ice-sheet in the glacial period illustrates so forcibly the leading peculiarities of the movement as the White Mountains. Viewed in their continental relations, the striæ, or the markings left upon the ledges by the passage of the ice, seem to diverge from a point not far west of Hudson's Bay; those in New England running south-east, those in New York south, and those of Minnesota south-west. The highest summits in New Hampshire exhibit the southeast course of the striæ.

In the decline of the ice-age, the White Mountains seem to have had some of their valleys filled with local glaciers pushing to all points of the compass. Previous observers have overlooked the south-east courses upon the higher summits, and confounded certain modifications of the principal movement with the later ones. Perhaps, rather, they have not acknowledged that any ice passed over the Presidential Range from the north-west, but have considered that the whole system of glaciation consisted of movements radiating from the central summits outward.

My father, in 1841, found striæ running south-east upon Mts. Clinton, Pleasant and Franklin, and somewhat above the Lake of the Clouds, about five thousand feet high. He insisted that the ice producing these marks came up-hill from the north-west. No other geologist has discovered any phenomena inconsistent with this original announcement; but I can add to it the finding of striæ upon the summit of Mt. Washington pointing south 43° east, and the presence of boulders weighing

as much as ninety-three pounds, satisfactorily identified with ledges five or six, and probably fifteen miles distant. Two circumstances have prevented others from observing what is so very obvious upon the top of Mt. Washington; first, the surface is strewn with angular blocks severed from rough boulders and ledges by frost and gravity, so as to conceal the presence of the till and obscure the striæ. Reflection will satisfy any one that even these angular blocks have been transported short distances, since their present situation forbids a derivation from any visible ledges. Second, such novel atmospheric conditions prevail at the summit that strangers are apt to neglect taking proper geological observations.

These conclusions seem legitimate respecting the ice action over the whole Presidential range.

1. The glacial ice completely covered the whole range, passing in a south-east direction from the St. Lawrence valley towards the Atlantic Ocean.

2. The ice brought moraine-rubbish and glaciated stones from the northern base of the range to the several summits.

3. This ice also brought an immense number of angular blocks of the same material with the mountains, and strewed them over the summits, best seen upon Mts. Madison, Adams, Jefferson, Washington and Monroe.

4. Frost and gravity acting in historic times split up these transported blocks and the projecting ledges so as to present a uniform aspect of Arctic desolation, and obscure the usual phenomena of glacial dispersion.

The following is a list of the most important observations of striæ seen by me about the White Mountains, corrected for magnetic variation of the needle.

Ridge north-east of Mt. Madison . . .	about S. E.
Mt. Adams, west side, 5500 ft. . . .	S. 58° E.
Mt. Adams, south-west peak, south part. . .	S. 58° E.
Gap between Adams and Jefferson . . .	S. 33° E.
Mt. Washington (west of Signal Service Sta.), top	S. 43° E.
200 ft. above Lake of Clouds	S. 30° E.
Lake of Clouds	S. 22° E. × S. 52° E.
Between Pleasant and Franklin	S. 30° E.

Between Pleasant and Clinton	S. 30° E.
Near top of Mt. Clinton, north side	S. 47-52° E.
Mt. Clinton, south peak	S. 50° E.
Mt. Webster, top	S. 37° E.
Mt. Webster, south end	S. 30° E.
Mt. Field, side towards Mt. Willard	S. 37° E.
Mt. Field, top	S. 50° E.
Mt. Willey, top	S. 42° E.
Hart's Mountain, near top	S. 52° E.
Mt. Tom (by Crawford House) north-east side	S. 57° E.
Mt. Tom, south side	S. 57° E.
Top Mt. Willard	S. 23° E.
Notch by Railroad	S. 2° E.
Several places between Notch and Willey Brook, along Railroad, southerly.	
Just south of Willey Brook	S.
Mt. Pequawket, 2500 ft.	S. 42° E.
Mt. Lafayette, above Eagle Lakes	S. 8° W.
Bethlehem, Mt. Agassiz, top	S. 8° W.
Bethlehem, commonly the same everywhere.	
Gorham, about village	about S. E.
Mt. Hayes	S. 40° E.

Others might be mentioned, particularly along certain valleys. We find along the Peabody valley, striæ varying from S. 8° W. to S. 22° W., ascending the carriage road upon the east side of Mt. Washington to the Half-way House. These have been examined with much care, and are found to proceed up the valley, judging from the peculiar shapes of the ledges. The side of a ledge struck powerfully by ice is always rounded, while the opposite side is rough, not having been acted upon at all; and this feature of the rocks in this valley indicates a movement to the west of south. It may have been coëval with the south-east movement over the higher summits, since this valley is on their lee side, and the ice descending the Androscoggin would to some extent be forced up the Peabody valley, and made to conform to its shape and direction.

The striæ in the lower Androscoggin and Ellis River valleys also conform to their topography. As these indicate a downward movement of the ice, they may correspond to local glaciers. It is difficult, however, to understand why the east and south-east valleys should exhibit these markings so wonderfully

plain, and none should be found upon the Ammonoosuc and Israel's Rivers. It is therefore possible that these eastern ice-movements may have been a modification of the south-east current, perhaps after it began to decline in intensity of action.

Towards the end of the glacial period we find evidences of glaciers radiating from the higher elevations. These are found in the valleys of the Peabody, Ellis and its Wildcat and eastern tributaries, East Branch of the Saco, the Saco itself, Ammonoosuc, Pemigewasset, and possibly Israel's River. The evidence is not derived from striæ, but the transportation of boulders. The Ammonoosuc is the one best known, and I will mention the instances of carriage noticed there. Peculiar Montalban granite from ledges about Mt. Deception occurs in lateral moraines opposite Fabian's and very near both the White and Twin Mountain Houses. The boulders at the last two named localities rest upon rocks of different character from themselves, and are more than four miles from their source. At the Crawford House are blocks of Chocorua granite, and at Rounsevel and Colburn's sawmill are enormous masses of a Conway granite, both of which have been transported northerly several miles. Below Twin Mountain station are large blocks of Albany granite found at intervals as far as Lisbon, indicating a travel of twelve miles from their source. There are thought to be moraines of this glacier just above Bethlehem and Littleton stations.

The Saco glacier had tributaries from Sawyer's River, Rocky Branch, Ellis River, East Branch and Kiarsarge Brook. Moraines are conspicuous in the main valley just below Sawyer's rock, the north base of Mt. Moat, the mouth of Rocky Branch, and in the edge of Conway to the south of Mr. Bigelow's summer house. The larger tributaries, like Sawyer's River, have pushed down very coarse deposits across the valley, resembling moraines. Excavations of them by the Portland and Ogdensburgh Railroad, show only clean water-worn stones. Each of the other glaciers exhibit various examples of lateral and terminal moraines sufficient to prove their former existence. As fast as the forest is cleared, these evidences will be made much more conspicuous.

An Ascent of Scar Ridge.

BY F. W. CLARKE AND GASTANO LANZA.

Read December 12, 1877.

Every traveller who has taken, upon a clear day, the stage ride up the Pemigewasset Valley, must have noticed, away to the right, a large mountain conspicuously marked with a scar. Unquestionably, Tripyramid answers this description; but the summit here referred to lies much farther north, almost in line with, and nearly half way between, Tecumseh and Lafayette. It is visible for many miles along the valley road, coming first into view near Campton, a little before Lafayette itself, and remaining in sight, off and on, until Woodstock is reached. From most points in the valley it is seen as a long, high, whaleback ridge, thrust up above many subordinate hills, and deeply scarred near its right hand end almost from the summit to the base. In short, after Black Mountain, Tecumseh, Osceola, and the so-called Haystacks, it is the most important summit to be seen on the east side of the Pemigewasset Valley.

Strangely enough, this great mountain mass, so prominent a feature in the finest views from Campton, seems to have been hitherto without a name. At Campton nobody knew anything about it, save that it was situated somewhere near that vague region denominated Thornton Gore. To be sure, one or two people thought it might be Hix Mountain; but Hix, upon investigation, turned out to be an altogether smaller affair. At Thornton and at Woodstock the ignorance was equally dense. Even to the dwellers at its base it was a nameless mountain. The stage drivers could offer no suggestion of a name wherewith to satisfy inquisitive passengers. Only upon the recent maps published in APPALACHIA is it dignified with a title, and that is the almost universal one of "Black Mountain." It seems as if every peak for which no other name can be found, must be saddled with this ubiquitous appellation. In this case, however, the only Black Mountain recognized locally is the so-called "Sandwich Dome." The name of Black Mountain, then, as applied to the summit in question, may properly be ignored; as lacking the warrants either of definiteness or of usage.

Quite naturally, a mountain so conspicuous and so little known excited our curiosity. We felt that it ought to be looked after and attended to, or, in other words, climbed, measured, described, and brought properly under respectable Appalachian control. For four summers Prof. Clarke had gazed upon it from a distance, too much occupied with other scrambles to be able to give it suitable attention, questioning people in vain in regard to its name. At last, during his fifth season at West Campton an opportunity came and was duly improved.

On the eleventh of August, 1877, we started from Sanborn's Hotel, armed with mercurial barometer and tripod, aneroid and thermometer, compass, pedometer, and lunch-bag, bound upon a journey of investigation and discovery. Our ride was first for ten miles up the familiar stage road to Woodstock Bridge, and then for five miles more following the valley of Eastman's Branch. The last portions of the ride, through Thornton Gore, were very interesting. We were away from the beaten track, and every moment gave us fine views of unfamiliar mountains. On our right were Hix Mountain and other spurs of the great Tecumseh group, while on the left rose a wilderness of summits, among which the Loon Pond and Russell Mountains might perhaps be identified. For a long time the main object of our journey was out of view, thrown behind intervening hills by the twistings and turnings of the road. When at length it came again into sight, we scarcely recognized it. The slide was hidden by a projecting shoulder, the long ridge was foreshortened, and, because of the height of our view-point, the summit seemed lower than we had expected it would. It was only after careful enquiry that we satisfied ourselves concerning the identity of the mountain before us with the one which loomed up so strikingly when seen from Campton. Towards the end of our ride, moreover, Osceola came in sight, rising squarely before us, apparently closing in the valley, and seeming even higher than when viewed from Greeley's. This obviously tended to diminish by contrast the importance of the mountain we were seeking. At Campton we had said that the nameless summit

must be at least four thousand feet high; here, we shook our heads dubiously, and feared that even three thousand might be too liberal an estimate.

At about eleven o'clock we reached Merrill's, the last inhabited house on the Gore road. Here we left our horse and buggy, and adopted the more primitive and more Appalachian mode of travel. First, however, we questioned Merrill closely about our objective mountain, but without much satisfaction. His sons had been to the slide, but they, unfortunately, were not gifted with the faculty of giving other people clear and concise directions. All we could definitely learn, was that a logging road went in towards the mountain, and that a brook flowed down from the slide. This brook was one of two near the house, but which one nobody seemed to be certain. So we asked our way to the logging road and started in, trusting that with good fortune we might be able to guide our steps aright.

From Merrill's the regular carriage road continues for about half a mile farther, coming to an end at one of the deserted farmhouses unfortunately so common in New Hampshire. This house we took as the base of our measurements, and accordingly determined its height above the sea with great care. Readings of both aneroid and mercurial barometers were secured at once, and another aneroid set was taken upon our return. About ten days later Prof. Clarke made a second trip as far as this point, and obtained still additional data. The mean of all these observations fixes the elevation of the house at 434 metres, or 1423 feet, above the sea level.

Near the house the logging road began, distinct and easy to follow. But in a very little while the distinctness was lost in the midst of a woodchopper's paradise of sticks, stumps, and fallen trees. Here we lost all traces of the path, and were thrown upon our own resources. Fortunately there was near us a brook which apparently came from the proper direction, and this we took for our guide. The woods afforded tolerably easy travelling, with comparatively few jackstraws and little underbrush, and for half a mile or more the ground was practically level. But we travelled very slowly, for no mountains

were visible through the trees, and we stopped frequently to take our bearings, uncertain whether we were really upon the right track. Soon the brook began to flow more abruptly, over many rapids and small cascades, and we found ourselves to be very decidedly ascending, as if upon some spur of a steep elevation. Thus we tramped along, meeting no special difficulties, until suddenly, at about a mile and two-thirds from the last house, we struck the foot of the great slide. A more clearly marked slide could hardly be imagined. At the foot it came to an abrupt end in a heap of gravel and stones, fringed with fallen timber. Above, as far as we could see (but we were far below the portion visible from the valley), it presented the appearance of a cleanly cut gully, perhaps fifty metres wide, following the sinuous course of the brook. Our height above sea level was now, by aneroid, 687 metres, or 2255 feet.

From this point on, our course was plain enough. Around bend after bend, and curve after curve, we followed up the gravelly bed of the slide. At only one place were we obliged to make a detour through the woods, and that was but for a few rods, in order to avoid a small cascade with overhanging, clayey walls upon each side of it. For perhaps a mile the grade was tolerably steep, but not enough so to be difficult. At last we came to the abrupt portion of the slide so conspicuously visible from Campton, and here the real climbing began. We found ourselves at the foot of a steep, rocky incline, sloping at an angle of about thirty degrees, and with a vertical height of perhaps two hundred metres. We began to realize that the mountain was a mountain, after all; and that our first estimates of its height were not by any means extravagant. Upward we toiled over smooth and slippery sheets of gneiss, which sometimes overlapped like shingles upon a steep roof, and were washed completely bare of soil. We began to get continually widening views towards Plymouth, and beyond to Cardigan Mountain and the southern Kearsarge. At first, the western view was cut off by a high spur thrust out from the mountain parallel with the slide, but even that we were soon able to look over. Gradually the slide grew narrower and narrower, then we reached its apex, scrambled through a few

intervening rods of mossy evergreen woods and underbrush, and stood upon the summit of the mountain. We found ourselves upon the highest point of a long, narrow ridge, heavily wooded, and falling off steeply upon both sides. Only faint glimpses of views were to be had between the trees, but we saw enough to realize that if the summit should be cleared it would command an admirable outlook over the valley of the East Branch, with a fine sweep to the south and west also. Still, as far as view is concerned, this mountain could never be in any way remarkable. Its chief feature of interest is its steep, bare, rocky slide; which, though smaller, is as interesting as its rival upon Tripyramid, and decidedly easier of access. The broad sheets of gneiss we found here are far more satisfactory for climbing purposes than the loose stones and gravel at Waterville.

As heavy clouds were gathering, with threats of a thunder-shower, we remained upon the top only long enough to secure our barometric readings, and then hurried downwards. The height of the mountain proved to be 1166 metres, or 3824 feet, quite enough to be worth recording. The total distance from Merrill's was about three miles and a half, with no real difficulties on the way. On the whole, we could regard our trip as decidedly satisfactory.

Our return to Merrill's was rapid and uneventful. Soon after leaving the slide, we struck a continuation of the logging road we had missed on the way up, and which, although it was badly overgrown with bushes, was of course a help to us. At six o'clock in the evening we started on our homeward drive from Thornton Gore, shortly to be overtaken by as severe a thunder-storm as either of us had ever encountered. Fortunately our buggy was provided with boot and sides, so that we escaped a wetting. For the last five miles we rode through pitchy darkness, trusting to the intelligence of our horse, who understood his business perfectly. At nine o'clock we drove up to the door of Sanborn's, tired and hungry, but in no respect dissatisfied or disappointed with the results of our day's journey.

Of course, having climbed and measured the mountain, we felt bound to give it a name. Accordingly, we propose for it the descriptive title of Scar Ridge. It is a long narrow ridge, and it has numerous scars in addition to the great slide. As seen from Lafayette it appears as a ridge deeply scarred. From almost every point of view the name befits the character of the mountain.

Unnamed Mountains between Mt. Hancock and Scar Ridge.

BY WARREN UPHAM.

Read December 12, 1877.

The journey here to be described was made on the 18th of last October. That month was thickly filled with storms, which in our climate proverbially attend or follow the autumnal equinox. Nearly half its days were blessed with falling rain. Even amid such discouragements, a fine day may usually be obtained for a visit to the mountains in the interval between storms. It rains perhaps half the week, with east or north-east wind; the first fair day succeeding almost invariably brings a strong wind from the north-west; the next is the golden opportunity. The air is clear and calm, and the sky scarcely flecked by a cloud. These perfect days are well known as the precursors of stormy weather; often by the next morning the mountains are hid in clouds, and the rain is renewed.

There is one beauty of our woods and hills which can only be seen at this season. The leaves of the deciduous trees have changed from the uniform green of spring and summer, and seem to vie with the gorgeous colors of the western clouds, painted by the setting sun. The gold, scarlet, and crimson of this foliage, notably contrasted with the dark evergreen of the pine, spruce, hemlock, and fir, continue more or less noticeable for a month, holding the same relation to the year as sunset to the day.

The mountain which was the destination of this journey, is

from the mouth of the East Branch of Pemigewasset river. It bears almost due east by the magnetic needle, or north 75° east, as referred to the true meridian, and is about seven miles distant. Just discernible over its north ridge is a spur of Mt. Hancock, three miles farther east. Next to the north in this view, and only three or four miles distant, are the Potash Mountains. These are best seen from near the mouth of the Hancock Branch, where they appear to be two rounded domes of rock, as nearly alike as two Dromios, rising perhaps eight hundred feet above the valley. They are about a third of a mile apart, and nearly one mile north of the East Branch. It is said that fifty years ago these heights were covered with spruce woods, which were destroyed by a fire that also burned all the vegetable mould, leaving now only naked ledges scantily sprinkled with dwarf birches and poplars. It is only when seen from the valley south of them that these masses appear distinct and separate; viewed from Big Coolidge Mountain, which towers above them on the north-west, they seem rather as buttresses or spurs. South-west from the nameless summit first noticed, the view embraces Black Mountain, the termination of the range which extends north-west from Mt. Osceola; and Loon Pond Mountain, on whose top is a pond, covering perhaps fifty acres, lying at a height of nearly two thousand feet above the East Branch, and only about two hundred feet below the highest point of the mountain. This is east of the pond and consists of bald ledges, affording a fine, unobstructed prospect.

On the morning of the 18th I set out before sunrise, accompanied by Mr. Dura P. Pollard, who, with his brother William, has frequently traversed the East Branch wilderness, and will be found well-skilled in all arts of the woodsman. From their house, which is the last on the East Branch, a little more than a mile above its mouth, a good path extends along the north side of the Branch, which we followed for five miles to Birch Island, when we decided to cross the stream and begin the ascent of the unnamed mountain next west from Mt. Hancock. The points of interest passed in this distance are the Eddy, a deep basin in the East Branch, two miles above its

mouth ; Clear Brook, a tributary from the north at one mile farther ; and the mouth of Hancock Branch, two miles beyond the last. Above the latter point the valley of the East Branch changes its direction towards the north, having a magnetic bearing almost due north-east, while the Hancock Branch comes in at right angles to this course, or from the south-east. This wide divergence is occasioned by the mountain that we were to ascend, which lies between these streams, with its summit nearly east from their junction, and about two and a half miles distant. The route from Mr. Pollard's passes through woods till we arrive near the mouth of the Hancock Branch, where a burnt area, encumbered with fallen timber, extends for nearly a mile. With this exception, our day's journey was wholly in the forest.

From the open space mentioned, a very fine view is had of the long range that reaches from Osceola to Black Mountain. The south-east part of this range is marked by numerous small peaks, and has a very irregular, serrated outline. Its highest mass, which has been called Scar Ridge, is nearly three miles distant, bearing between south and south-east. The appropriateness of its name must be acknowledged by those who look upon this mountain from either side. Scarred on the south by a landslide of a few years ago, it is not less conspicuously marked on the north side by precipitous ledges that occur near its top, and again on its north-west flank, near the head of a deep ravine. Perhaps these are the marks of great slides that occurred centuries ago. Otherwise this mountain is covered with a dense growth of spruce and fir. Somewhere at the foot of the upper or south-east one of these ledges, there lies a good hammer, which incontinently flew off the handle, while being used by the writer in 1871 to obtain a specimen of rock at the top of the precipice. It went off, bounding merrily down, tick, knock, whack, clink, to the bottom, hundreds of feet below. It was not searched for, but a liberal reward will be cheerfully paid to the finder. About one and a half miles north-west from Scar Ridge, is the double-crested lower summit of Black Mountain. The length of this whole range is fully seven miles.

The waters of the East Branch are divided at time of high floods by Birch Island, which extends nearly a half mile before the two currents are again united. At the ordinary height of water only a very small stream flows in the east channel. The greatest difficulty of the day was to cross the main stream on the west side of the island. It may here be stated that nearly the whole course of the East Branch is over a bed of boulders, large and small, nearly all of them more or less rounded and water-worn, ledge exposures being rare. These boulders occupy a width of three to five hundred feet, bordered by wooded banks, five to ten feet higher. Commonly the stream fills only a small part of this channel, but at least once every year it is raised to the brim. Owing to the recent heavy rains it was now considerably swollen, but not at all like the floods produced by the melting snow and rains of spring. Its width varies from seventy-five to one hundred and fifty feet, and no place could be found where the greatest depth to be crossed was less than three or four feet. The principal difference between the narrow and wide portions is that in the former the current is very rapid, making it impossible to stand against it.

My companion and his axe proved useful in this emergency. We at first hoped to find some place at which the stream would be narrow, and at the same time flow near the bank upon which we were, so that a tree might be felled to reach across it. At the best point found, the width of the water probably exceeded one hundred feet. This width we under-estimated, and on the other hand over-estimated the height of a stalwart yellow birch that stood at the edge of the bank. Although this tree did not prove quite equal to our wishes, it was probably our best available resource, and its fate was forthwith decided. The sun was now well advanced in the sky, and, with the mountain of our ambition in full view on the opposite side, it was some trial of patience to wait a full hour till the hard heart of this tree, nearly three feet through, could be chipped away. The bridge thus supplied reached within forty feet of the farther side of the stream, spanning its deepest portion. The remainder, which must be forded, looked sufficiently formidable; but with the aid of stout canes, and by carefully

stepping on the tops of the boulders, we got quite successfully over.

It was now eleven o'clock ; which showed that, if we would secure time for observation on the summit, haste must be made in the ascent. Burdened only by a barometer, an axe, and dinner, we were in good marching condition, and two hours' hard work brought us to the top. Our route, which is perhaps as good as any, crossed the East Branch near the middle of Birch Island. The tree cut for our bridge was only a few rods from the mouth of Birch Island brook, which comes in from the west. At the opposite side of this island, a brook descends to the East Branch from the north-west side of our mountain. This we followed eastward about three-fourths of a mile, climbing seven or eight hundred feet, to the junction of the two streams by which it is formed, one coming from the east, the other, and larger, from the south-east. The former has its source upon the north spur of the mountain ; the latter drains the hollow that slopes northward between its principal summit and a lower western ridge. After following the south-east brook about a third of a mile, we climbed the rest of the way, probably more than a mile, upon the north slope of the mountain east of this brook. These ridges are all covered with a heavy growth of wood, consisting of maple, beech, birch, spruce, and balsam fir. Rarely an enormous white pine is found. About halfway from the junction of the brooks to Birch Island, we noted a giant of this species, five feet in diameter at its base, with its lowest limbs put forth at a height of forty feet, where the trunk was apparently three and a half feet in diameter.

At the highest point of the mountain the trees were thirty to forty feet high, being birches and balsam firs ; and they are so numerous and slender-topped that it is difficult to climb high enough for an unobstructed view on all sides. Our axe was used to cut down or blaze several of the trees on the summit, and a fire was built so that we might have a warm dinner. A week's work of a good chopper would clear this mountain-top, and he would be rewarded for his labor by the prospect thus opened. At the west and north-west lie the lower part of the

East Branch valley, Moosilauke, the Lafayette Range, and Haystack ; at the north are Mts. Bond and Guyot, about five miles distant ; toward the north-east, Mt. Willey is seen at nine miles, and Mt. Washington at eighteen miles ; eastward, the massive and high wooded ridge of Mt. Hancock, three miles distant, and fully three miles long from north to south, conceals all the mountains which lie beyond itself, including Mt. Carrigain. The highest point of Mt. Hancock is near the middle of this ridge, and has a magnetic bearing north 85° east.

From our point of observation the descent is quite steep toward the south, as is noticeable from the mouth of the East Branch. This permitted a careful delineation of the mountain profiles seen in this direction, including the well-known outlines of Chocorua, Passaconaway, Tripyramid, and Osceola. The summit of Chocorua has a magnetic bearing south 45° east. In the direction between this summit and Passaconaway, we discover a prominent mountain that is not well shown on the new contour-map published in APPALACHIA No. 3. By reference to that map, it will be seen that the summit from which we are looking, lying west of Mt. Hancock, is represented, but without a name. Three miles south-east from this point, and about half as far south-west from the south end of Mt. Hancock, the contour-map shows a low ridge nearly in the place of the prominent one seen in our view between Chocorua and Passaconaway. These two notable mountains, lying in a region quite remote from settlements, appear never to have received any names, either from residents or tourists, and I will venture to propose for them the titles *Mt. Hitchcock* and *Mt. Huntington*, in honor of the State Geologist of New Hampshire and his principal assistant ; the former being the mountain shown west of Mt. Hancock, which we had ascended ; and the latter, which appears to be the higher, being that seen three miles to the south-east. Both these mountains are bounded on all sides by valleys a thousand feet or more in depth. The top of Mt. Huntington is nearly level for a half mile from east to west. Mt. Hitchcock, which lies in three masses, having lower summits at the south and west, is the termination of a curved range of high mountains, separated by deep notches, which

extends eight miles east and north-east to Mt. Nancy. The central and highest one of them is Mt. Carrigain, 4678 feet above the sea.

In the same line with Passaconaway, the south spur of Mt. Hitchcock rises about a mile from our place of view, being some two hundred feet lower, with a separating hollow two or three hundred feet deep. A little farther to the right is Tripyramid, seen over Mt. Kancamagus and a nearer high ridge. Next west is the deep, smoothly moulded hollow of Mad River notch, bearing by the needle south 10° east; succeeded by the two lofty summits of Osceola, and the serrated range which extends thence to Scar Ridge and Black Mountain. This range may be well studied from Mt. Hitchcock, being separated from it by the deep valley of the Hancock Branch, with no intervening ridges.

Barometric measurement shows Mt. Hitchcock to be approximately 3600 feet above the sea, being some 200 feet lower than Mt. Huntington and Scar Ridge. It is about 2600 feet, or nearly a half mile, above Birch Island and the mouth of Hancock Branch.

The rock of which this mountain is formed is that denominated Conway granite in Prof. Hitchcock's report on the Geology of New Hampshire. It has an extensive distribution in our mountain region. Localities where it may be seen are the Basin, Pool, and Flume in Franconia, Goodrich's Falls in Jackson, and throughout the town of Conway.

A Partial Ascent of Sierra Blanca.

BY SAMUEL H. SCUDDER.

Read October 10, 1877.

Garland is the present terminus of the south-western extension of the Denver and Rio Grande Railway, which during the past summer has been carried over the Sangre de Cristo Mountains at the Veta (or Abeyta) Pass to the height of 9454 ft. — a height only surpassed by a road traversing the Andes of Peru. The town of Garland, at the time of my visit, was less

than a month old, but being the outfitting point for all parties bound to Santa Fé and other parts of New Mexico, or to the wonderful mining district of San Juan in south-western Colorado, it was already a thriving village of more than a hundred houses, including two large hotels, shops of every description, and an alarming proportion of conspicuous drinking and gambling saloons, where most of the population seemed nightly to assemble.

Nobody could give any information about the mountains of the Sierra Blanca. Although apparently close at hand, the distance to the base was variously estimated at from five to twenty-five miles. As to the ascent, no one had ever heard of its being attempted, and some declared that it would take two days to reach the summit.

Previous to attempting a partial ascent of the mountain, I climbed a little hill, which from the opposite side of Ute creek overlooks Baldy Peak, one of the two mountains forming the principal part of the Sierra Blanca, and discovered that the ascent of either Baldy or Blanca Peak would be perfectly simple and easy on the side which stretched toward Garland. From the more or less heavily wooded lower half of either mountain, long, gently sloping, parallel, "hog-back" like ridges descended to the south, and the longest of these, whose surface was quite barren of trees or even shrubs, extended from the base of Blanca Peak to a point far down on Ute creek (a stream rising between Baldy and Blanca) affording a ready means of approach, mounted or afoot. Blanca Peak seemed more accessible than Baldy, and I determined to reach at least the timber line and obtain some insects of the barren regions.

On the morning of August 29th, my companion and I started from the town a little before seven, on foot, instead of on horseback, as we had intended, which would have enabled us to reach the wooded base of the mountain in an hour and a half, and given ample time to reach the summit; but now my only ambition was to reach the timber line and secure an hour's collecting.

Our canteens filled at a spring just outside the town, we started over the plain which separates Sangre de Cristo and Ute

creeks. Had we not crossed a part of it the previous day we might have estimated the distance at only two or three miles, but we were an hour and a half twisting in and out among the unyielding clumps, and stopping occasionally to capture a stray insect. We aimed for the lowest extremity of the hog-back, and reckoned the distance across the plain in this direction to be about five miles. On the way I took, for the first time in my life, a butterfly of the subfamily of Vestales or Erycinids, a species of *Chrysobia*, perhaps new, flying swiftly at that early hour among the sagebushes, somewhat after the manner of a *Thecla*. In passing over this plain, I was struck by the close resemblance the general tone of color given by the sagebrush to the landscape bore to that of the winter hue of the olives in southern France.

In Ute creek we found a clear, cold body of water, with plenty of trout, and here my companion and I separated. Some minutes were spent in penetrating the thick and tangled growth of the bottom, but by quarter before nine I had reached the top of the lower extremity of the long ridge by which I had planned to approach Blanca. This ridge was passed in an hour; its surface was covered with a scanty growth of dry bunchy grass and a few flowering plants, but the only butterflies seen were *Cercyonis Meadii*, *Papilio Antiopa* and *Eurymus Eurytheme*. From this ridge it was plain that the ascent of Baldy was nearly as simple as that of Blanca, and half tempted me to change my plan, as the climb above timber (if there were time for it) would carry me to the principal summit, while on Blanca, it would only be possible to reach one of the subsidiary peaks of the circling ridges, whose highest point was the most distant. As it seemed improbable that I should be able to reach even this lower peak of Blanca, and as the limit-of-timber line was nearest at hand on the route I had marked out, I adhered to my original plan and pushed on to the timber, leaving this ridge to gain the next, lying further west. This was the end of open walking; the further side of the ridge faced the mass of Blanca itself, and was separated from it by a narrow and rather deep valley. The slope of this valley was formerly covered with pine forest, but had been destroyed by

fire, and between the fallen and partially erect hardened timber, had sprung a dense chapparal of slender poplars just higher than one's head. Through this thicket I forced my way, although, had I but known it, by following the ridge I could have reached a point lower down in the valley without meeting with any undergrowth at all, while the ascent of the valley by the brook would have been a simple task. After all, mine was probably the quickest, as it certainly was the shortest route. Before descending, however, I studied the face of the opposing mountain, and concluded that the south-easternmost extension of the south-eastern spur was not only the nearest and shortest, but the most advantageous point of attack. From here the ridge was continuous to the summit of the lowest peak. All the spurs were covered with the same chapparal growing amongst fallen timber, but that to the south-east had more open spots along its ridge, affording not only an occasional cessation of hostilities with the thicket, but an outlook and better opportunity of encouragement, with a sense of increasing altitude.

It was half past ten when I entered the timber. At the brook in the valley I replenished my canteen, suspecting it was the only water I should meet until I returned to it; and so it proved, although there were doubtless springs in one of the ravines on the south-westerly side of the mountain, not far from timber line, where I started a fine buck and doe half a mile away. At first the ascent above the brook is very steep; probably about as steep as the slope above timber line; and this was scarcely, if at all, less than the south-westerly slope of Baldy, which I estimated as varying at different points above timber from 38° to 42° . A little below timber line the ascent is less steep, the chapparal vanishes, and one walks in an open grove of barkless pines — a silver forest, where most of the trees are fallen. But the climbing seems scarcely less difficult, for the limit of ten thousand feet is long since past, and a summer's experience in high altitudes shows (at least in my own case) that this limit of ten thousand feet marks the line above which one can put forth no exertion whatever without noticeable loss of breath; even after resting a long while, as after

spending half an hour at full length on the grass, enjoying a lunch, a minute's exertion will necessitate a halt for breath, especially if one moves up hill. The same thing occurs after riding up a mountain. I found the chase for insects on Mt. Lincoln just as fatiguing, or rather just as exhausting, as elsewhere, and yet I rode the entire way. It is a strange, and by no means agreeable sensation.

As soon as the chaparral was past, insects became more common. Hitherto a buzzing fly had been almost my only companion. Now, among others, several butterflies appeared, such as *Parnassius Smitheus*, the dark form peculiar to high elevations, a species of *Eurymus*, distinct from that seen below, *Agriades Orbitulus*, a bluet found in the European Alps, and occurring also everywhere in high altitudes in the Rocky Mountain region, and a Fritillary, which I failed to capture or recognize. Only two Orthoptera (both Acridians) were taken, — a crackling *Œdipoda*, *Œ. undulata*, found also on the plains below; and the little *Gomphocerus Carpenterii*, also found above, and doing its best to outstridulate his bigger neighbor.

Much to my surprise I found myself at timber line by one o'clock. The forest ended rather suddenly with the shortened, thickened and gnarled pines (*Pinus aristata*), and above their limit not a tree was observed, except occasionally and for a little further this same pine, growing singly and still more stunted. Nor were there any clusters of bushes, such as the willows that grow about the Argentine Pass, or the willows and gooseberries which mingle with the clumps of dwarf pine on Mt. Lincoln and its vicinity; or the various kinds of *Vaccinium* which share the soil with the dwarf spruce in the alpine regions of the White Mountains. There was a green sward mostly composed of sedges, mosses and a *Potentilla*, apparently the same as that so abundant as a bush or shrub on the plains below, but here hugging the earth. Further on, the lower half of the barren summit was covered with small, loose fragments of rock set in the sward. Still higher, large rocks of diorite of varying degrees of coarseness were commingled with the smaller in a loose, movable heap, with only here and there a little patch of sward, scarcely large enough to lie upon. There

were nowhere any of the terraces or gentle slopes of sedge variegated with flowers, one sees in our White Mountains, or indeed upon other Coloradan mountains; but everywhere the slope was steep, often precipitous, and the scattered fragments of sward scarce find a resting place; while the scanty flowers creep out from beside the larger stones, or fringe the lesser trails of gravel which mark the course of the rain-flow. I paid no great attention to the flowers, but could not fail to notice the *Polemonium confertum*, so persistent in accommodating itself to every altitude on all the high mountains I ascended, and a thistle, apparently *Cirsium eriocephalum*, with a bushy head as large as a child's, drooping from a stalk which often raised itself in protected nooks to the height of several feet. As to insects, I was greatly disappointed; the day was perfect; there was little wind; a few ants came about me as I ate my lunch at timber line; but the host of butterflies and moths, of Hymenoptera, Diptera and Orthoptera, which crowded about us at Mt. Lincoln, were almost wholly wanting here; there was scarcely an Orthopteran sound; and though the cries of some of the mountain mammals were frequently heard, the notes of birds were rare indeed. This scarcity is no doubt due to the form of the mountain, which admits of little vegetation above timber; to the uniformity of its surface also, which affords no sheltered nooks or gulleys where moisture can collect and flowers nestle in the sun. The only butterflies I saw were two I captured: one, *Rusticus lupini*, never before recorded from Colorado, at the height of about 13,000 ft.; the other *Eneis semidea*, our own White Mountain butterfly, a single specimen of which I was lucky enough to take at the very summit of the lower peak. Of Orthoptera I only took three species, *Gomphocerus Carpenterii*, *Pezotettix Marshallii* and *Platyphyma montana*, all known before at similar altitudes, viz.: from 12,000-13,000 ft. *Caloptenus spretus* was not seen. I was surprised not to find, nor even to hear, that noisy and ungainly Locustarian, *Anabrus coloradus*. I had neither heard nor seen it on the Rio Grande side of the Sangre de Cristo range until I reached the upper limit of the long hog-back, up which I climbed to reach the base of the mountain; from here

it accompanied me until I entered the wood ; and I fully expected to find it again above timber as I found it (or a closely allied species) on Mt. Lincoln, swarming at every footstep so long as there was any vegetation worth eating, or up to a height of at least 13,000 ft., and as Lt. Carpenter also found it at a similar height on Taos Peak, N. Mexico.

Reaching timber line at such an early hour, I could not forego the pleasure of a further climb ; but owing to my frequent delays on the road, both for insects and for breath, I was over two hours in reaching the first, lowest and south-eastern peak of Blanca ; there are three other peaks higher than it, the highest 14,413 ft., or the highest point in Colorado, but this one, or Blanca 4 as we should call it, must be not far from 13,500 ft. Blanca 3 is the north-western peak, and when the summit of Blanca 4 is reached, is hidden from sight by Blanca 2 ; this latter peak (13,615 ft.) is separated from Blanca 4 by a sharp ridge which descends considerably midway between the two ; the ridge runs not far from east and west, and while its northern side is a precipice, its southern is composed of rather small, loose rocks, and has a slope of nearly 45°. In ascending by the route I took, one must pass Blanca 2 to reach the main summit and crawl along this knife-edge. A similar serrated ridge, about a mile and a half in length, and curving around toward the north, connects Blanca 2 with the main summit, and I estimated that it would require two hours and a half to pass from the point on which I stood to the highest peak and back again. As it was already three o'clock, and I had neither food nor blanket and was entirely alone, it was plain that I must turn back ; yet I was most unwilling to leave the spot, so inspiring was the scene. Directly opposite me, as I reached the top, were the pale grey crags and stony flanks of "Old Baldy," variegated here and there with broad scars of brown gravel, or a ruddy sprinkling of granitic pebbles ; so distinct was every feature over its surface that it seemed as if I could leap upon its rocks. The serrated, nearly perpendicular walls of Blanca enclosed an amphitheatre, a mile or more in diameter, bounded upon the east by the sharp slopes of Baldy ; patches of streaked snow crowned every heap of talus that

hugged the cliffs, but found no lodgment on their precipitous sides; the rocky bottom was scooped into rugged basins at different elevations, in which lay great black pools of unruffled water; there were at least four of these of large size, and most conspicuous among them were two which lay, one below the other, the higher feeding the lower, and lying just beneath the most elevated cone of Blanca Peak at a height scarcely less than that at which I stood. From recollection, I should judge it was nearly eight acres in extent. Traversing every part of the floor of this gigantic amphitheatre, were intrusive veins, nearly black in color, extending in a general north-southerly direction, intersecting and dividing, and running up the flanks of the opposite cliffs.

Turning about, one sees the Rio Grande winding tortuously through a broad green belt of timber at the further end of a desolate ocean-like plain, lying far below. To the south-east the tumultuous billows of the Sangre de Cristo Mountains, stretching far into New Mexico, play with the clouds which overhang them. Between them and Baldy are seen those gems of beauty, the Spanish Peaks, with their sharp cut ridges; and the tent-like form of Veta Mountain, around which the railway seems eternally winding as it ascends the Veta Pass, and which only its curious and changing form prevents us from stigmatizing as a heap of dirt. To the north, between Baldy and the summit of Blanca, rise the craggy tops of the Greenhorn Mountains, which from this point reminded me more of the aiguilles of the Alps than any mountain crests I have seen in this country.

But from these our eyes descend again wistfully into that deep dread basin, bearing the marks of the scourge of rain and hail, frost and ice, still as death with its darkling pools of icy water. Had I but a companion, late as was the hour, I should have essayed those depths and clambered as best I could down the steep valley where those waters flow. But now I turned regretfully down and hastened to reach again the open country beyond the timber. After regaining the woods (at 3.45), thinking I had descried an easier way, I plunged down the slope to the left, climbed the opposite ridge,

and upon its further slope entered once more the chapparal. A good half mile of this tangle, which tore my insect net to shreds and left more than one rent in my clothing, brought me again to the side of the hog-back by which I ascended. By half past five, after more climbing through the woods, I reached my former footsteps, and at quarter past six I was again at the creek, at a point higher up than before. Half an hour was spent in crossing the bottom, and in a refreshing plunge in the clear water of the brook. Darkness came on while crossing the sage plain, and it was no enviable tramping ground, stumbling among the old roots and falling headlong over ant-hills after thirteen hours' marching. Garland was hidden behind a low ridge which separates the valley from the plain; a wagon road entered it through a low point in the ridge, but there were so many roads, old and new, running in various directions, that in the end I missed it and went beyond. The baying of dogs gave me at last the right direction, when in the darkness the outline of the ridge was lost in the wooded slopes beyond, and I finally stumbled into the town adown the stony sides of the ridge, coming out by "Sam's free corral" shortly after eight o'clock. It is always a little vexatious to pass a road and not know it; but I chanced to mark the time (7.40) when I reached a road I afterwards knew to be the one I sought, and it is at least a solace to remember that I crossed that endless sage-plain by a longer route, at the close of a twenty-miles' tramp, in less time than it had taken in the morning.

The map (Plate x) accompanying this paper has been kindly prepared by Dr. Hayden from the original atlas of Colorado, constructed by the U. S. Geological Survey of the Territories. The heavy line from Garland to Sierra Blanca marks the course of the route taken in the ascent, which from the base of the mountain is the same as that taken by the members of the Survey in their study of the range. The contour lines are two hundred feet apart.

The Moat Path.

BY JOHN WORCESTER.

Read January 9, 1878.

Before the great fire in 1854, Moat was the greenest mountain visible from North Conway. The varied foliage of hard and soft wood trees was scarcely broken by the small precipices skirting the lower part of the slope, and just distinguishable at a few other points.

A little column of smoke appeared, I think on the morning of Sept. 30th, to the right of the north peak, and had scarcely crept over the shoulder when the fire was seized by a gale from the north-west, and driven furiously the whole length of the mountain, consuming the trees and the soil, and leaving only a whitened surface of calcined rock.

A visit to the scene of the fire, the following summer, revealed some interesting details of its work. Around the border of the expanse of bare rock remnants of soil were seen, in some instances from one to two feet thick, which proved to be a mere shell crumbling to ashes and sand under the feet. It appeared also that the violence of the wind, caused by the union of the gale and the draught of the fire, had in some places blown down the trees and blown out the flames, actually limiting the spread of the fire. Notably was this the case at the base of the north cone, which was encircled by a collar of charred spruce trunks twisted and broken, and lying together in wild confusion.

This collar of fallen wood, about half a mile in width, has constituted the chief obstacle in the ascent of the mountain; for there has been no escape from the necessity of climbing laboriously over the ruin, with no little danger to garments. Also the base of the mountain has gradually been covered with a thick growth of poplars and birches, through which it was not easy to climb; and a still further difficulty has arisen from the perplexing network of logging-roads crossing the plain between Moat and the Ledges.

In August last, Dr. Wilbur B. Parker, joining Wm. L. and Charles P. Worcester, with whom the plan originated, suc-

ceeded in overcoming all these difficulties, and in opening a good path to the top of the mountain. The logging-road starting from Mr. Lucy's, at the spot unfortunately named Diana's Baths, is clearly marked by guide-boards; a broad well-cleared path runs with remarkable straightness through the young growth at the lower part of the ascent; over the bare rock the way is indicated by cairns placed near together — all the nearer on account of their having been built in a dense fog; and, most important of all, a very pretty bit of path, carpeted with moss, runs straight through the wearisome "jack-straws," and is continued to the top of the peak.

Near the entrance of the jack-straws a short branch of the path, designated by a guide-board, leads to a spring, which has been carefully cleaned out and stoned. During the latter part of September, as the water in the spring was reported low, the work was done over more thoroughly. Possibly in extreme droughts the water will fail; but in ordinary seasons it will probably be abundant.

The distance from Mr. Lucy's to the top of the cone, roughly measured with a knotted cord, is about fifty yards less than three miles and a half, and is about equally divided between the logging road to the foot and the ascent. The distance from the Kearsarge House to Mr. Lucy's, measured in the same way, is almost exactly three miles; making the whole distance from the Kearsarge House to the top about six and a half miles, — a result which is an agreeable surprise to those whose notion of the distance had been much exaggerated by the former difficulties of the way.

After the path was finished, it was traversed by many parties of ladies and gentlemen. The summit is now so easily accessible, and is likely to be so generally visited, that it is no longer an appropriate place for an Appalachian bottle. It is suggested, therefore, that the bottle should be brought away; and that the old record, which is already considerably mutilated by rude hands, should be deposited in the archives of the Club.

The White Mountains from Monadnock.

BY J. RAYNER EDMANDS.

Presented February 13, 1878.

Apart from the interest which so many take in identifying familiar objects from some distant eminence, the view before us¹ derives special interest from the oft-quoted item in Sam'l Willard's journal,² and the attention drawn to it by the discussion concerning the name of the northern Kearsarge, or Pequawket (P 1.). The first journey,³ to ascertain what Willard may have seen, failed on account of the haze, although three ascents were made. But Mr. G. V. Fox offered again to meet the expense of the writer's visit to Monadnock, and Prof. E. C. Pickering was again interested to join the expedition. The object of this paper is to explain the method of obtaining the profile, and the reliability of the results, rather than to give a detailed description of the view, or to base any argument upon the facts deduced.

Arriving at the Mountain House early in the afternoon (Nov. 3d), an ascent was immediately undertaken; but as the wind, which had blown down the Coast Survey signal the preceding night, had hardly abated, while many clouds still floated about, the camera was not carried up. Next morning gave better promise; and it was a matter of congratulation all day, that the principal obstacles to distinct vision lay in directions not now claiming special attention. The forms of the distant mountains were indeed small, but the summer haze was gone, and the snow on the summits and in the ravines and land-slides added a novel element of beauty. The whole day was devoted to the object in hand, the instrument (dismounted and loaded with stones) being left near the summit while a descent was made for a warm dinner. Nor was the mid-day climb the only time that exercise was taken as a stimulant. The west wind was both strong and cold, so that instead of occupying the very

¹ See Profile, Pl. XI.

2 * * * "camped on ye top of Wannadnack mountain and Discovered 26 pounds Saw Pigwackett lying one point from sd mountain and Cusagee mountain and Winnepesockkey laying north East of sd Wannadnack." (Mass. Archives, 38 A.)

³ See APPALACHIA, Vol. 1, No. 3, p. 156.

summit of the mountain it was necessary to find an "eccentric" position, where the instrument would not be blown over, and where the observer would not be too quickly chilled.

Since the path ascends from the south, the northern view opens suddenly as the summit is neared. The clearly cut lines could not fail to inspire enthusiasm, and "Why! there is" — came involuntarily to the lips. But the exclamation was suppressed, and each silently made a sketch recording his independent first impression regarding certain summits. Then followed a free exchange of opinion, after which work was resumed. Prof. Pickering studied the view with a glass, made careful sketches of the details, and recorded opinions or conjectures concerning what was seen. The writer drew two independent profiles with the topographical camera¹; one the distant view between Moosilauk and Gunstock, the other more comprehensive in foreground as well as horizontal range. The slowness of the camera drawing was due to several unusual obstacles. The position was forced, the shelter of the rocks being necessary; the cold ledge and patches of frosty turf were numbing to the limbs; and great care was required to avoid omissions, from confounding snow on some of the higher summits with the bank of white cloud above them.

The profiles have since been carefully measured, and the horizontal angles compared with a manuscript map of Mr. W. H. Pickering, thus verifying, strengthening or modifying the impressions formed at the time. A distinction has also been made between certainties (iv), matters which hardly admit doubt (iii), strong probabilities (ii) and reasonable assumptions (i), using the Roman numerals to distinguish these grades on the profile. Conjectures are unaccompanied by a numeral, but are sometimes followed by a query. The "iv" is reserved for whole ranges, as the Ossipee Range, and for very characteristic or conspicuous forms, as Chocorua and the fourth summit of Tripyramid with its land-slide: no doubt therefore is expressed by using the "iii." It merely recognizes the possibility that some other person might entertain a doubt. The

¹ For description of camera see APPALACHIA, Vol. I, No. 3, p. 169.

incomplete brackets over the Franconia and Twin Mt. Ranges indicate that the line of separation has not been seen. The point for which the conjectures Osceola and Tecumseh are given is marked "π" to indicate a strong probability that it is either one or the other. Mt. Washington (the highest point visible), Mt. Jefferson (the most distant) and the South Moat (of which only the summit is seen) were not drawn in the camera, but were obtained from the eye sketches. They are therefore shown in dotted lines. Approximate distances are given in kilometers.¹ Many points are shown without attempting to identify them, thus opening a wide field for future determinations; for it is to be remembered that these lines were drawn on the spot, in conformity with the image formed in the camera obscura. Since the 180° mark of the scale is brought as near as practicable to the north, the readings give directly the geodetic azimuth (very nearly); but it will generally be better to measure from some known point on the profile. The errors in position, although greater in the copy than on the original drawings, will not interfere with this use of the measurements, which may conveniently be read to tenths of a degree.

A greater source of error arises from the liability to mistake an insignificant for an important ridge-line, to omit a ridge entirely, or to fail to follow with the pencil the minutest matters of form. Evidently a complete profile requires, throughout, the treatment which has here been given to the distant view between the Franconia and Ossipee Ranges: *i. e.*, make two independent camera drawings, study the distance with the glass, making eye sketches, and carefully compare the angles with the map in identifying. Then, for the middle distance and foreground, the observer should revisit the spot with a tracing from the camera drawing, and make alterations on the tracing, wherever the errors before referred to are detected.

¹ One kilometer is about five eighths of a mile. For closer work subtract six miles per thousand miles, but notice that the figures for distance (on the profile) are approximate.

Secretary's Report for 1877.

At the close of 1876 the Club contained 134 active members. Since that time there have been added 58 active, 22 corresponding, and 11 honorary members, and three active members have withdrawn, making the present number of active members 189.

There have been nine regular, and three field meetings held during the year, the former at the Mass. Institute of Technology, in Boston, the latter severally at Arlington Heights and Lexington, Mass., and the Fabyan House, White Mts., N. H. Also an exhibition of paintings and sketches, and an exhibition of stereopticon views of mountain scenery, at the Mass. Institute of Technology.

Two numbers of APPALACHIA have been issued, No. 2 in March, and No. 3 in July, 1877.

The library of the Club has grown from a few pamphlets to a considerable collection of bound volumes, pamphlets, and maps, for most of which we are indebted to the heads of the United States Government Surveys, and especially to Dr. F. V. Hayden, Gen. A. A. Humphreys, Lieut. G. M. Wheeler, Maj. J. W. Powell and Capt. C. P. Patterson. We have also received in exchange for APPALACHIA the publications of the California Academy of Sciences, Essex Institute, Cambridge Entomological Club, Vermont Historical Society, Italian Alpine Club, and Norwegian Tourist's Club. The library is at present at the Mass. Institute of Technology, where any of the books or maps may be consulted by members of the Club. For convenience of reference a full catalogue of the library, has kindly been prepared by Mr. Geo. Dimmock, and will be found on page 290.

Respectfully submitted,

J. B. HENCK, JR., *Secretary.*

Treasurer's Report for 1877.

The receipts for the year were as follows:—

Balance on hand January 10, 1877	\$29.36
Amount received in 1877 for admission fees and assessments ¹	312.00
Amount received by Secretary and Treasurer for Appalachia,	74.05
Amount received from H. O. Houghton & Co., for Appala-	
chia	18.00
Amount received from A. Williams & Co., for Appalachia .	5.95
Total Receipts in 1877	<u>\$439.36</u>

The expenses were as follows:—

March 21. J. B. Henck, Jr.'s bill of expenses of	
Art Exhibition	13.45
" " A. A. Kingman's bill for printing postal	
card notices, catalogues, etc.	30.45
May 12. A. A. Kingman's bill for printing and bind-	
ing 500 copies of Appalachia No. II .	115.24
" " J. R. Osgood & Co.'s bill for printing	
maps and profiles for same	40.00
" " J. B. Henck, Jr.'s bill for postage, etc. .	7.60
June 13. " "	8.60
July 17. A. A. Kingman's bill for printing and bind-	
ing 500 copies Appalachia No. III,	
including alterations	156.89
" " Julius Bien's bill for printing 550 maps of	
White Mountains	35.75
" " Julius Bien's bill for additions to above .	6.25
" 21. Heliotype Co.'s bill for printing 550	
" Maps of points near Lowe's Path " .	10.00
Oct. 31. J. B. Henck, Jr.'s bill for postage, etc. .	9.75
Nov. 14. " "	4.25
Total expenses in 1877	— \$438.23
Balance in the Treasury	\$1.13

\$439.36

H. F. WALLING, *Treasurer.*

¹ Of this amount \$8 were from original members for the assessment of 1876, and \$50 were for admission fees due in the latter part of 1877, and applicable according to Art. XIII of the Constitution to the assessment of 1878.

Reports of the Councillors.**Natural History.****REPORT ON BOTANICAL WORK, PREPARED BY B. PICKMAN MANN.**

Read May 9, 1877.

[The following is a specimen of the lists, described in APPALACHIA, No. 3, p. 185, and accidentally omitted from that number. Copies of the full lists, and of Mann's Catalogue, may be obtained from the Secretary, as there announced; it is hoped that all members interested in botanical work will provide themselves with copies, and make use of them in reporting to the Department their work during the next and succeeding summers.]

**PLANTS WHICH MAY BE OF THE WHITE MOUNTAINS, DISTRICT
OF , FLOWERING IN:**

	March.		April.		April.		April.
21		120		497		1665	
498		121		498		1668	
1554		144		499		1679	
2447		152		729		1683	
3647		182		733		1688	
	April.	189		734		1695	
20		207		762		1840	
21		208		770		1896	
23		209		818		1900	
24		210		849		2316	
42		213		866		2319	
46		214		867		2432	
55		215		1051		2446	
59		217		1139		2447	
68		220		1215		2451	
69		288		1554		2464	
93		418		1599		2538	
117		431		1624		2542	

Reports of the Councillors.
Topography.

BY J. RAYNER EDMANDS.

Read November 14, 1877.

The tenth article of our Constitution prescribes, that it shall be the duty of the Councillors, "at the November meeting to report to the Society the operations of the Club during the preceding summer." Does this mean that they are to interview each member in order to obtain the necessary material, or does it rather imply that the members will *promptly* come forward with whatever facts are in their possession? It is believed that two causes operate to prevent this action on the part of members: first, the underrating of the value of what they may have done; second, the failure to appreciate how much the Councillor may be helped by receiving a brief statement *in writing*, from each member who has accomplished anything for his department. This should be especially borne in mind by those interested in Topography, for if they send in no synopsis before their results are arranged for presentation, the department may long be left in ignorance of important work done.

The accurate foundation upon which our work is to rest, has not progressed as we had hoped, owing to the failure of certain Congressional appropriations for the Coast Survey. In regard to the department operations, which are to furnish a stepping-stone from the Government triangulation to the work of individual members, the experience of the past summer has established a point worthy of mention, concerning the mounting of the transit or theodolite, with which the necessary angles are read. We discard the wooden tripod, and attach to the base of the instrument a triangular plate of metal, carrying three short pegs which rest directly upon the rock. This device, introduced by Professor Pickering a year ago, secures great steadiness even on windy summits, and enables us to work at points where it would otherwise be very expensive to attain the desired accuracy. The subject of modifying instruments and methods to suit our peculiar circumstances is a very important one, and it

is gratifying to be able to report that several members continue to give it their attention.

Among the detail surveys of the past summer may be mentioned: the determination of the relative positions of buildings and other points upon the summit of Mt. Washington; the location of certain summits with reference to the line Osceola-Black (Q 8.) as a base; the location of Boy Mountain and a station near the Mt. Adams House with reference to Mts. Adams, Washington and Cherry; and the filling in of certain "missing links" in the work of a year ago upon the Great Range and in the town of Jefferson. As the results of these surveys are not yet worked up, they are given without the names of the participants.

The erection, July 21, of a signal on Mt. Adams by Messrs. C. E. Lowe, C. A. Wellington, and A. E. Scott has been reported. Although unaware of the movements of the party who erected it, we observed its direction from Mt. Washington only a few hours after it was put in place. Prof. E. C. Pickering, Mr. J. B. Henck, Jr., and the writer, have been interested in a research upon atmospheric refraction, in its relation to the determination of heights, being assisted therein by an appropriation from the Rumford Committee of the American Academy. In connection with this work the first and the last named spent a week or more on the summit of Mt. Washington, while at the same time Mr. Henck occupied Mt. Kearsarge (U 1.). Thanks are due to the management of the Mt. Washington Summit House for courtesies extended. Profs. Clarke and Cross have continued the barometric observation of heights.

On the whole, the direct results of the summer do not equal those of last year, and several elements have conspired to produce this result. Prominent among these may be mentioned the large amount of cloudy weather and the prevalent haze.

Our thanks are also due to Tufts College for the loan, through the courtesy of Prof. C. D. Bray, of a theodolite reading vertical and horizontal angles to twenty seconds: also to our President, Mr. Scudder, for the use of a mercurial barometer, which he has moreover placed at the disposal of the department for the coming year. : Members having instruments which they are

prevented from using themselves, can help the Club by loaning them (either directly or through the department) to those who will be able to use them.

In some respects we ought to improve next year upon either of the preceding summers. But many of our members have rather a short vacation among the mountains, and each year they are doubtful concerning their ability to get any time the year after. They may be very zealous for Appalachian work, but can we, under the circumstances, expect them to invest in plane tables and cameras? Suppose, now, that the department should have the control of several such instruments. The one carried to the mountains by A in July could be used in August by B, and on his return home it could be passed over to C for work during September. And the borrowing and returning of the instrument would necessitate that communication with the department so desirable to ensure efficiency. Again, in requesting the erection of signals on certain points, the department should be able to promise, with proper limitations, to meet the expense. Not having the means to do this, we are apt to have signals erected with some important condition unfulfilled; while many important points remain without signals. *How shall we get the means?* This problem is commended to the early consideration of members interested.

Reports of the Councillors.

Art.

BY JOHN WORCESTER.

In the brief sketch of the work desired in this department, presented to the Club at the beginning of the summer, it was suggested that notes of interesting views would be welcome. Perhaps it may now be appropriate to call attention to the two most impressive views that have since fallen under our notice, with a few observations on the general subject.

There is a natural disposition among visitors to the mountains to rush to the tops of the highest peaks to find out how far they can see. All summer long people are crowding to the

summit of Mt. Washington and peering off into the distance. If they can distinguish the line of the ocean, sixty-five to seventy miles away, and, still better, if with a powerful glass they can see little white specks which they take for the sails of ships in Casco Bay, they are thoroughly happy; though, in fact, they would get a much better view of the sails of ships from the wharves in Portland, or from a little boat in Boston or New York harbor, than from the top of Mt. Washington.

What has been said of the view of ships in the distance, applies also to the other features of the flat country, — there is a topographical interest in seeing it spread out from a mountain top; but we have, for instance, a much finer view of the Conway and Bartlett intervalles from the stage road than from any mountain; and, at least as regards its beauty, the same is true of every intervalle, river and lake. But among the mountains we have mountains, rocks and ravines such as can be seen no where else. If the visitors to Mt. Washington would come down to Boott Spur, and walk out on the wall that separates Tuckerman's Ravine from the Gulf of the Slides, looking down occasionally into the Ravine, they would receive an impression much better worth recalling than any ideas they can gather from the distant haze.

Even in regard to mountain views, the lovers of noble beauty will gain an advantage by placing some restraint upon their climbing propensities. Nothing else so destroys the dignity of a mountain as to climb a higher peak and look down upon it. It is somewhat interesting to observe the grouping of the adjacent mountains from Mt. Washington; but there is no other point of view so unfavorable to their grandeur.

The most favorable position to see the full majesty of a mountain, is upon a somewhat lower mountain or slope, with a deep valley between. As we ride along a country road, in descending a hill, a level at the foot seems like an ascent, and a moderate ascent looks like a steep hill. The effect is the same in looking across a valley from one mountain to another, especially if the other rises a little higher than the first. There is comparatively little foreshortening; but the ascent is stretched out at its full height before us.

Probably the noblest view of this kind in the White Mountain group, is that of Washington and Jefferson from Mt. Adams. Here the grandest of the mountain masses is seen from this peak second in height, across the great gulf that divides between them nearly to their bases. In a summer afternoon, as the shadows begin to descend into the gulf, bringing out the forms of the limbs of the mountains, and the rugged outlines tempered by the soft air are seen against a clear dark-blue sky, the dignified repose and the loveliness of the mountains are perhaps as impressive as anything the range can show.

Another view somewhat similar is that of the cone of Chocorua seen from the north-eastern ridge of the same mountain. Chocorua is commonly ascended, from the east, through the ravine of Chocorua brook, the path running at the bottom of the valley till the direct ascent begins. A mile, or a mile and a half, to the north of this path, another leaves the same road at the house of Mark Knox, and immediately climbs the long ridge which forms the north wall of the ravine. When the summit of this ridge is reached, at an elevation of about a third the height of the mountain, there is an open view of the highest peak rising steeply from the very bottom of the ravine. The view of Washington from Adams is on a larger scale, and has a grander effect; but this has a picturesque beauty all its own, not in the least diminished by acquaintance with the other. After enjoying exceedingly the beautiful panorama from the top of the mountain, comprising the pretty lakes at the south, the fine forms of the Sandwich range immediately in the west, and the graceful curve of the Willey Notch, flanked by the Presidential group, in the north, not forgetting to glance down this precipitous slope to the bottom of the ravine, we come back to the view of the Cone of Chocorua from its own north spur as the finest sight from this mountain.

It is proper that the report of this department should preserve a record of the exhibition of pictures enjoyed by the Club on the fourteenth of March last. Through the kindness of Boston artists, and members of the Club — artists or friends of art, — the walls of the lecture-room in which our meetings are held were covered with pictures of much interest and

beauty, mostly from mountain subjects. A full list is given below. So agreeable and so numerously attended was the exhibition, that the room was thrown open to visitors a second afternoon and evening. The success of the occasion was largely due to the industry of our excellent Secretary, who was unwearied in his labors, and to the generous forbearance of the officers of the Institute of Technology, who, at much inconvenience to themselves, gave up their lecture-room to the Club for three whole days. It is to be hoped that we shall not again trespass so heavily upon their generosity; but if the success of the exhibition is thought to warrant a repetition the present year, an effort will be made to secure the use of a proper art-gallery, where the pictures may remain a reasonable time with no inconvenience to any one.

Mention should also be made of Mr. Kilburn's admirable series of views for the stereopticon, which were exhibited to the Club by Mr. Sands on the evening of November fifth. For this exhibition, which was highly enjoyed by a large assembly, the Club is indebted to the suggestion of our former President.

PAINTINGS AND SKETCHES.

Exhibited March 14, 1877.

VIEW.	ARTIST.
1. Mt. Washington, from Jackson.	J. A. S. Monks.
2. Pasture at base of Mt. Washington.	Miss H. M. Knowlton.
3. Mt. Moriah and Bald Mt., from Junction of Moose and Androscoggin Rivers, Gorham.	Miss E. Scott.
4. Mt. Washington (and Adams); Sketch from Bartlett.	Miss E. Adams.
5. Mt. Kiarsarge (Carroll Co.), from North Conway Intervales.	A. Ordway.
6. Woods near Glen House.	Miss H. M. Knowlton.
7. Mt. Chocorua and Chocorua Lake; Sketch from Madison.	Miss Curtis.
8. Same.	"
9. Same.	"
10. Passaconaway; Sketch from Madison.	"
11. Black Mt. (Sandwich), from Campton Village.	Geo. L. Brown.
12. Franconia Notch, from Woodstock.	"

VIEW.	ARTIST.
13. Black Mt. (Sandwich) and Tripyramid, from the West.	A. Dyckerman.
14. Mt. Ascutney, from Claremont.	A. Ordway.
15. Mt. Washington, from the North-west.	A. Dyckerman.
16. Emerald Pool, Pinkham Notch.	S. L. Gerry.
17. Moat Mt., rear of the Kiarsarge House.	A. Ordway.
18. Moat Mt., from the Intervale, North Conway.	Edwards.
19. White Mountain Notch, from Mt. Willard.	B. Champney.
20. Sawyer's Pond and Green's Cliff.	"
21. Mt. Lafayette, from Ammonoosuc River, Franconia.	S. W. Griggs.
22. Mill Brook Cascade, Thornton.	A. Dyckerman.
23. Echo Lake and Mt. Lafayette.	"
24. Mt. Washington, Glen Road, Jackson.	F. H.*Shapleigh.
25. Mt. Israel. Study.	A. G. Hoit.
26. Mt. Chocorua. Study.	"
27. Western View from Mt. Adams House.	Mrs. W. G. Nowell.
28. Presidential Range from Israel River Valley.	"
29. Mts. Madison, Adams and Jefferson, from Bowman Place.	"
30. A. M. C. Camp on Mt. Adams.	"
31. Prospect Hill, Jefferson, N. H.	"
32. Mt. Washington, from Glen House.	Miss H. M. Knowlton.
33. Mt. Madison.	"
34. Toll House and Mt. Adams.	"
35. Mt. Adams at Sunset.	"
36. Burning Woods — Mt. Madison.	"
37. Mt. Washington from the Glen.	"
38. Cannon Mt. Sketch from Thornton.	George L. Brown.
39. Welch Mt. Sketch.	"
40. Bridgewater Mt., from Plymouth.	"
41. Carter Notch, from Thorn Mt. Road.	E. F. Fenollosa.
42. Mt. Desert, Me. Water Color.	Miss Susan Hale.
43. " " "	"
44. Near Wolfboro, N. H. "	"
45. Bar Harbor, Mt. Desert. "	"
46. Camden Hills, Me. "	"
47. View in Bethel, Me. "	"

Reports of the Councillors.**Exploration.**

BY THE COMMITTEE APPOINTED APRIL 11, 1877.

For some time past a want has been felt by many members of the Club, for some book to which any one could refer, who contemplated the ascent of a mountain, and there learn all the particulars with regard to it; the best method of ascent, the extent of time to be allowed for it, and the distance to the summit. Also whether water would be found, and numerous other smaller particulars. It would also be very interesting to compare one mountain with another as to the extent of the view, and especially with regard to the relative difficulty of the two walks. The Guide Book partially answers these wants, but it is not full enough, and particular facts cannot be found, without reading through much irrelevant matter.

Accordingly the appended circular has been printed, and it is hoped it will be largely circulated among the Club, and that many will fill out the blanks.

Copies may be obtained from the Secretary at any of the meetings, or they will be sent by mail, on application. As many questions as possible are to be answered, the remainder being left blank, and the report returned to the Secretary. Many circulars might even now be filled out from memory, and in most cases all the questions answered with the exception of the first and fifth. As soon as handed in, these reports will be pasted into a letter book provided for the purpose, which will be placed where it may be consulted by all; it will also be at the summer field meetings. When several reports have been handed in, regarding the same mountain, so that it is certain that the descriptions and estimates are exact, a final report will be made out from them and laid one side. When we have a sufficient number of these, they will be collected in the form of a book and perhaps published. In this manner it is hoped to obtain accurate descriptions of all the White Mountains. It is also intended every year to publish a list of all the more important mountains which have

not been thoroughly explored and described; and in this way it is hoped ascents will be made, and descriptions handed in, which would otherwise not have been obtained. It will also tend to prevent the too large increase of duplicates of certain mountains, and at the same time cause reports to be handed in about mountains which might otherwise be considered too well known to require them.

In filling out the first part of the circular, regarding the identification of the mountain, all the information may be obtained from Osgood's Guide Book, or the map in APPALACHIA No. 3, and all blanks should be filled out.

1st Question. "Rests" means the time in minutes spent in resting at or between the places of observation. Whenever distances and elevation are given, the units should always be stated; metric units being preferred. The simplest method of reducing miles to kilometres is to multiply by the fraction $\frac{16}{9}$ or $\frac{8}{5}$, whichever is most convenient. This gives a result thirty-one feet too small for each mile, which is evidently inappreciable for ordinary purposes. For the convenience of those who do not care to accurately observe their rests, but are satisfied with estimating them, a space is left below the table to insert the total time expended in resting during the ascent, the stay on summit, and the descent. And in all cases these blanks should be filled.

2d Question. Observations should generally be taken at the streams, and they may then be identified by the table in Question 1. In the classification of course accuracy cannot be obtained, as the results would differ from year to year. What is desired is a mere estimate, and any estimate is better than none at all.

3d Question. Considerable space is left for this question as it is really the description of the walk. The "time of ascent" and "distance" are inserted for the benefit of those who take no observations, and should always be filled out.

4th Question. By "lawn" is meant smooth grass, as on Mt. Pleasant, and it must not be confounded with the use of the term as applied to certain elevated regions on Mt. Washington.

5th Question. The question here arises as to what we shall call an obstruction. The reply would vary with different persons, and the question could really best be answered by a profile. A person on Mt. Washington viewing objects at distances of a hundred miles or more might regard Mt. Lafayette as an obstruction, but generally it would hardly be so considered. It is always better however to include too much than too little, and the more obstructions described the better.

6th Question. If the "Distant Point" is unknown, say simply "Mountain," "Lake," or whatever it may be, and estimate its distance by the eye. If this estimate is right within ten or twenty miles, and the bearings are given, these will generally be sufficient to identify the object. Considerable space is left under the heading "Notes," but if this should not be found sufficient in any case, blank sheets the size of the circular will be provided. By means of a map of the path any stream, or point of special interest may be identified much more readily and accurately than by any other method.

Name.

Symbol.

Lat.

Lon.

Elevation.¹

Distance and Direction from some well known point or points.

1. Observation at Starting Point, Destination and Points of interest on the way (boulders, views, streams, springs, etc.).

Place.	Hour.	Rests.	Distance.	Elevation.

Time expended in resting during

The Ascent.

Stay on Summit.

The Descent.

2. Reliability of the Springs, Streams, etc., in dry weather (r stands for "reliable." u for "usual," and o for "occasional.")

3. Character of Path, directions for finding it in case it is obscure; also time of ascent and distance approximately.

4. Character of Summit (ledge, boulders, sand, lawn, scrub, or trees).

5. Kind, direction, and extent of obstructions to view.

6. Distant Points visible, and bearings or directions from known points nearly in line; also Towns, Steeples, bodies of water, and other objects of general interest in sight.

Notes.

This heading is intended to cover any remarks on the Geology of the mountain, the various growths with which it is covered, and various ways of ascent; statements regarding the Fauna, Flora, or Topography of the region, and in general any useful information with regard to the mountain. When on the summit make special note of the 5th question, and also if possible sketch a profile, as it or a tracing of it would be of value to the Club. A map of the path would also be desirable. If the walk includes several mountains, one circular should be filled out for each one.

Names of party.

Date.

¹Also Method of determination or Authority.

Reports of the Councillors.**Improvements.**

BY W. G. NOWELL.

Read Nov. 14, 1877.

Work in this Department has been carried on during the past season mainly in the construction of

Paths.

*1 1. — *On Mt. Adams.* The path made and measured in 1876, and so much used that year and the next by lovers of mountain heights and by workers in the topographical department, has been improved by use and labor. Stumps and trip-roots have been cleared out and holes filled.

The path branching from this main path about 2250 metres from its beginning at the Moose, and passing through King's Ravine, has been brought nearer completion by further chopping and by piling stone signals among the boulders, and on the irregular upper floor of the amphitheatre. This Ravine; probably the grandest among the White Hills, and so difficult of access that its passage has been hitherto attempted by but few, has been so far opened to pedestrians that several ladies have entered its wide portals, crossed the barrier of boulders heaped midway its depths, and climbed out through its wonderful gateway to the massive brow of its precipitous head-wall; and then have visited several of the mountain peaks above.

The distance from the Moose to the beginning of the Ravine Branch Path is 2250 metres; from there to the Boulders, about 2200 m.; thence to the Gateway, about 1600 m.; and from the Gateway to the summit of Adams (F 3. 1), about 1000 m. The last two sections of the route will require from most pedestrians more expenditure of time and strength than the first two.

*12 2. — *Through Carter Notch.* The exploration of Aug. 26, 27, 1876, has led to the partial construction of the paths and other improvements planned for this Notch and the overlooking heights of Carter Dome. During the autumn of 1876 and the summer of 1877, Mr. Jonathan G. Davis, whom the exploration party found living near the first road-gate on the Carter Notch road from Jackson, and easily induced to forward the

undertaking they had in view, amply fulfilled his pledges by cutting a good path up along the Wildcat River, very nearly as indicated in the report of that exploration (APP., Vol. I, No. 2, pp. 76-86), and in the report of this Department for 1876 (APP., Vol. I, No. 2, pp. 111, 112). The path crosses the Little Wildcat and its small upper tributary, as before ; but the Wildcat proper is crossed but three times, and then only to avoid difficult climbing over projecting spurs of the Wildcat range or making wide detours around windings of the stream. These crossings are nearly equidistant from each other. They were provided with excellent log bridges, but these were swept away by heavy freshets in August. The stream can, however, be easily crossed dryshod upon the stones of its bed at ordinary stages of water ; logs will be prepared and kept near the crossings for use at other times. The path runs for long distances by the side of the babbling brook, and being quite gentle in ascent save for the last 500 of its 5000 metres, offers opportunity for an agreeable walk, by charming nooks of moss-covered rocks and through a forest growth picturesquely varied, to one of the wildest and weirdest spots to be found among the mountains that immediately surround the Great Hills.

In June, 1877, Mr. Chas. E. Lowe, of Randolph, took two men with him and made a second exploration of the slope between the Peabody River and the ponds that lie in the Notch, camped near the lower pond, and on the next day made between the two ponds the first stroke for the extension of this path to the Glen. Passing to the north side of the upper pond the path was carried over the lowest part of the rise of land whose crest constitutes the bottom line of the Notch as seen from points northward or southward of it, and thence directly down the northwest slope to the forks of Nineteen Mile Brook near the foot of the Great Slide. A second night was spent in a good bark camp which the chopping party built when about half-way out, and on the third day the cutting was finished, along the eastern slope of Wildcat Mt., to the head of the Glen House aqueduct path. Along the lower three kilometres of the way it was necessary to cut the bushes out for a width of five to seven metres, to make sure that they would not fall over into the path and obstruct it.

The length of the path from a stone cairn on the right of the Carter Notch road, 8600 metres from Jackson, to the Ponds is about 5000 metres, and from the Ponds to the head of the aqueduct very nearly the same. It crosses the line of the Notch 45 metres above the Ponds and 1020m. above sea-level. The level of Jackson (Thorn Mt. House) is 235m.; of the cairn just mentioned, 585m.; of the forks of Nineteen Mile Brook at the foot of the Great Slide 800m.; of the Glen House, 497m.; of Carter Dome (G 6.1), 1470m.; of Wildcat Mt. (M 1.1) 1325m. These figures, excepting those for the two hotels, are approximate determinations made by the party that located the path in 1876.

3.—*Up Moat Mountain.* The logging-road from Diana's Baths to the foot of Moat Mt. has been marked by guide-boards; and from the brook at the foot of the mountain an excellent path, about 2400 metres in length, has been cleared, and distinctly indicated, to the top of the north peak. This work has been accomplished by a volunteer party consisting of Dr. W. B. Parker, William L. Worcester, and Charles P. Worcester. Further particulars concerning it will be found in a paper printed on p. 267 of this number of Appalachia.

Besides these Paths, something has been done in the way of building

Camps.

1.— That mentioned as having been constructed while the northern section of the Carter Notch Path was being cut through will serve as resting-place to those who may climb from that side in the heat of the day or as night shelter to any who may be belated in their descent or may wish to extend their explorations along the slides beyond a single day.

2.— The old shed-shaped birch-bark camp near the Ponds in the Notch has been renewed, and not far from it a new closed camp has been built, and furnished with a stove and a shelf for candle or lantern. This camp is over three metres long, about two and a half deep, and as high at front; will accommodate six sleepers comfortably. It is covered with hemlock bark.

3.— Near the original A. M. C. camp at 3^k.05 on Lowe's Path another open forest camp, larger, stronger, and facing a

better way, has been put up, with a frame of silver birch covered with the stout bark of the tall firs of that high region. The front edge of the roof is 2m. from the ground, and the structure covers a space 5m. long and 2.7m. deep ; it will accommodate seven persons comfortably, and has sheltered thirteen detained over night by a rain.

Record-Bottles.

Bottles have been deposited on Iron Mt., Aug. 26, 1876, by G. Lanza ; on Mt. Osceola, Sept. 4, 1877, by F. W. Clarke and W. H. Pickering ; on Mt. Fisher, Sept. 6, 1877, by W. H. Pickering and G. C. Anthony ; on Mt. Sam'l Adams, in Aug., 1877, by C. E. Lowe.

Copies of the Map of Located Points near Lowe's Path to Mt. Adams (Pl. VIII) have been prepared in paraffine to be placed in bottles at the principal points indicated on the map.

Signal-Staff and Meridian-Line.

This Department caused a staff, 5m. high and 10cm. in diameter at the butt, to be prepared by Mr. C. E. Lowe in the upper forest of Mt. Adams, and on July 21, 1877, the staff was carried to the summit of the mountain and placed in position by Mr. Lowe and several gentlemen and ladies from Lexington, Mass., members of our Club. The pole was set two metres west of the smaller staff planted by Mr. B. F. Osgood, July 12, 1875.

July 18, 1877, Messrs. Scott and Wellington of the same camping party that erected the signal staff, cut a compass meridian-line in a rock near by, arrow-heading the northern end and lettering it N.

In closing this report, your Councillor need merely add that the improvements thus far effected were found to afford much convenience to members of the Club and other mountain visitors in 1877, and that our paths would have been more frequented, and more record-bottles would have been deposited and used than during the previous active season, had not moist and cloudy weather prevailed.

Catalogue of the Library.

Prepared by George Dimmock.

[The sizes of all charts and maps in the list are given in centimetres.]

- Alpino Italiano**, Club, Bollettino del. (v. Turin.)
- Appalachian Mountain Club**. Publications. (v. Boston.)
- Blanc, Mont.**
Ascensione al Monte Bianco . . . nell' Agosto del 1875 di Luigi Dell' Oro di Giosuè. Milan, [n. d.]. 27 p. 4°.
- Boston**. Appalachia. vol. i, 1876-77. nos. i-iii. p. 1-206. 8°. pl. 1-8. 2 maps.
- California Academy of Sciences**. Proc. of the Cal. Acad. of Sciences, vol. vi, 1875. San Francisco, 1876. 222 p. 8°.
- , Medical Society of.
Report on Med. Education to the Med. Soc. . . 1877, by Arthur B. Stout. San Francisco, 1877. 11 p. 8°.
- Cambridge, Mass.** Psyche, Organ of the Camb. Entomological Club, vol. i, 1874-'76. 248 p. 8°.
- Club Alpino Italiano**, Bollettino del. (v. Turin.)
- Coast Survey**, U. S. (v. United States.)
- Connecticut Valley**.
The N. Part of the Conn. Valley in the Champlain and Terrace Periods, by Warren Upham. [Sep. from Amer. Journ. Science and Arts, Dec., 1877.]
- Cuba**.
Mapa de la Isla de Cuba y Plano de la Habana. [Pocket Map, n. d.]
- Hayden's Survey**. (v. U. S. Dept. Int., Geol. and Geog. Surv. Terr.)
- Italiano**, Bollettino del Club Alpino. (v. Turin.)
- Kristiania**. Den Norske Turistforenings Årbog. Udgivet af N. G. Dietrichson. 8°. For 1875 (217 p.), contains
- Mohn**, E. Eventyr tilfjelds. p. 1-53.
- Reusch**, H. Nogle Ord om alpeformer. p. 54-56.
- C.**, O. A. Smatterier fra en reise i Nordland sommeren 1874. p. 57-89.
- Hoegh**, S. Udsigten fra Molde. (Med et farvetrykt panorama.) p. 90-101. [Panorama is separate.]
- Slingsby**, William Cecil. An English Lady in Jotunheimen with an ascent of Glitretind. p. 102-118.
- Helland**, Amund. Om botner og sækkedale samt deres betydning for teorier om dalenes dannelse. p. 119-147.
- B.** En overgang over Justedalsbræen. p. 148-153.
- (—p.) Tur til Skjördalsfossen, Juklevand og Folgefonnen. p. 154-157.
- Helland**, Amund. Oversigt over dybderne i norske indsøer. p. 158-159.
- Notiser, p. 160. Lovbestemte fredningstider, p. 166. Kort fremstilling af forholdet mellem grundeierens ret og den almindelige frihed til jagt og fiskeri (Af norsk jæger- og fiskerforenings bestyrelse), p. 168. Årsberetning, p. 171. Kasseekstrakt, p. 158. Statuter for den norske turistforening, p. 190. Turistforeninges funktionærer, p. 192. Medlemsfortegnelse, p. 193. Navnenregister, p. 214.
- For 1876 (230 p.), contains
- Asbjørnsen**, P. Chr. Andreas Wulfsberg Grötting. p. 1-8.
- M.** En rundtur gennem Söndmøre. p. 9-41.
- Graff**, Harold. En tur til Ronderne. p. 42-60.
- B.**, J. B. Smastykker af en gammel turist.
- Mohn**, E. Tindebestigninger i Jotunheimen. p. 78-122.
- N.**, O. Fra Ryfylke. p. 123-135.
- Dietrichson**, N. G. Galdhöppiggen og Snehætta. p. 136-146.
- Höidemaalinger fra Söndmøre og Romsdals fogderier. Meddelt fra den geografiske opmåling. p. 147-153.
- Blix**, P. Den østerrigske turistklubs "schutzhaus" på Raxalp. (Med en lithograferet tegning). p. 154-156.
- L.**, S. Lidt om Kvinesdalen og Råfossen. p. 157-160.
- D.**, N. En liden afstikker. p. 161-164.
- [From p. 165 to end of volume consists of notices similar to last volume, p. 169 to 217.]

Massachusetts Commission for the Protection of C. Cod Harb. Comparative Map of C. Cod Harb. showing Physical Changes between the Surv. . . in 1835 and the . . . Surv. . . in 1867. 1867. 37×75. 800000.

New Hampshire.

Journal of a Tour to the White Mts., in July, 1784, by Jeremy Belknap . . . from the original ms., with a prefatory note by the Editor. Edited by C. D. [Charles Deane]. Bost., 1876. 21 p. 8°. map.

On the Origin of Kames or Es-kers in N. H., by Warren Upham. 8°. [Sep. from Proc. Amer. Assoc. Advanc. Science, 1876. p. 216-225.]

The Greenstones of N. H., and their Organic Remains, by George W. Hawes. 8°. [Sep. from Amer. Journ. Science and Arts, Aug., 1876. p. 129-137. pl. iv.]

The White Mts. and Winnepissio-gee Lake Guide Book. Bost. 1846. 76 p. 16°.

New South Wales.

N. S. W. Intercolonial and Phil. Intern. Exhib. 1. Mines and Mineral Statistics of N. S. W. . . by J. Lucas. 2. Remarks on the Sedimentary Formations of N. S. W. by W. B. Clarke. 3. Notes on the Iron and Coal Deposits, Wallerawang, and on the Diamond Fields, by Prof. Liversidge. Sydney, 1875. 252 p. 8°. pl.

Mineral Map and General Statistics of N. S. W., Australia. Sydney, 1876. 8°.

N. S. W., its Progress and Resources, by Authority of the Commission [to the U. S. Centennial Exhib.]. Sydney, 1876. 31 p. 8°.

Official Catalogue of the Natural and Industrial Products of N. S. W., forwarded to the Intern. Exhib. of 1876, at Phil., by Authority of the Commission. Sydney, 1876. 104 p. 8°.

New York.

Report of the Board of Comm. of the State Survey, . . . [Rep. to State Senate, N. Y.] [? Albany.] 1877. 36 p. 8°.

North America, Exploration in.

A Year of Expl. in N. A., Pres. Addr. before the Appalachian Mountain Club . . . by Samuel H. Scudder. 8°. [Sep. from Appalachia, vol. i, p. 207-242.]

Norway. (v. Kristiania, Den Norske, etc.)

Paris. *Revue Géographique.* 1876, p. 41-56, 233-292. 4°. 1877, p. 1-292. 4°.

Salem, Mass. Bulletin of the Essex Institute. vol. viii, 1876. iv, 161 p. 8°. vol. ix, 1877. p. 1-150. 8° pl.

Surveying.

Co-ordinate Surveying, by Henry F. Walling. 8°. [Sep. 19 p. 3 pl.]

Switzerland. (v. Turin, Boll. d. Club Alp. Ital.)

Turin. Bollettino del Club Alpino Italiano. Red. Dott. Martino Baretti. 8°. Quarterly.

Vol. xi [1877] nos. 29-31. pp. 1-500, contains

Tome, Cesare. Diciotto giorni per le montagne Dolomitiche [Alps]. p. 3-18.

Marinelli, G. Una visita alle sorgenti del Livenza e al bosco del Cansiglio, e un'ascesa al Cimon della Palantina (Monte Cavallo), 23, 24, e 25 luglio 1876. p. 14-76, Pl. i.

Dalgas, Gustavo. Un giro attorno al Pisanino. p. 76-84, Pl. ii.

Isaia, C. La Réunion Internationale des Clubs Alpins à Annecy, les 13, 14, 15 août 1876. p. 84-133.

Costa, Gaetano. Alcune escursioni nelle Alpi. p. 168-174.

Martelli, A. E. Dai Grands Mulets a Courmayeur per il nuovo colle du Tacul. p. 189-198.

Vallino, Filippo. Una salita alla Roguosa d'Étiache o Punta Lussart. p. 198-211, Pl. iii.

Ratti, Carlo. Escursione nelle valli del Pellice, del Guil e del Po. p. 212-237.

Marinelli, Damiano. Ascensioni diverse [Alps]. p. 265-266, Pl. iv.

I., C. La caccia in Ivizzeria. p. 272-274.

Valenti, Pietro. La caccia della marmotta in Valsesia. p. 274-280.

- Stoppani, Cesare.** Monte Bianco e Signal Kuppe. p. 281.
- Andres, Luigi.** I passi del Mortirolo, del Gavia e delle Scale di Fraele. p. 337-350.
- Curo, A.** Il Monte Gleno e il Corno dei Tre Confini (catena Orobica). p. 361-368, Pl. v.
- Martino, James de.** Ascensioni del Mönch e dello Schreckhorn. p. 358-372.
- Dalgas, Gustavo.** Cenni sommarii sulla regioni Toscana in rapporto allo scopo del Club Alpino. p. 372-382.
- Thomas, L.** Dalle montagne del Piemonte. (Dalle *Mittheilungen del Club Alpino Tedesco-Austriaco*, fascicolo 60, 1876). p. 382-402, Pl. vi-vii.
- Marinelli, G.** Pubblicazione dell'altrimetria della Penisola. p. 402-408.
- Digny, T. Cambray.** Ricoveri per gli alpinisti. p. 409-414.
- Boscoli, E. F.** Il Monte Bò. p. 414-419, Pl. viii-ix.
- Vaccarone, Luigi.** Una visita a Re Vittorio Emanuele all' accampamento di caccia. p. 440-449.
- Conconi, Guilio.** Da varzo al villaggio del Sempione per l'Alpe di Veglia ed il ghiacciaia di Auroua e del Mäderhorn. p. 453-460.
- Bona, Basilio.** Una salita invernale al Monte Mars. p. 460-462.
- Olivetti, Felice.** Da Biella al Lago Maggiore. p. 462-468.
- Livi, Carlo.** I Club Alpini e l'Anthropologia. — Cenni anthropologici della montagna Reggiana. p. 476-479.
- Bibliografia. p. 184-182, 238-254, 420-439.
- Miscellanea. p. 153-178, 255-281, 440-479.
- Necrologia. p. 179, 282-286, 480-486.
- Comunicazioni ufficiali. p. 180-188, 287-336, 487-500.
- Turistforenings** Årbog, Den Norske. (v. Kristiania, etc.)
- United States Coast Survey,** Catalogue of Charts. 1875. Washington [1875]. 28 p. 4°.
- United States Coast Survey.** Charts.
[The numbers are those of the charts as issued by the Coast Survey.]
- ATLANTIC COAST.
- Sailing Charts.
1. From C. Sable to Sandy Hook. 1864. 60×70. 1300000.
 2. Nantucket to C. Hatteras. 1863. 59×68. 1300000.
 - General Charts.
 7. From C. Ann to Gay Head. 1873. 77×96. 1000000.
8. From Gay Head to C. Hennen. 1852. 77×96. 1000000.
 22. Small Pt., Maine, to C. Cod, Mass. 1865. 79×93. 1000000.
 24. Nantucket Shoals, Mass. 1864. 49×58. 1000000.
- Coast Charts.
103. Mt. Desert Isl., Me. 1875. 36×44. 1000000.
 105. Penobscot B. to Kennebec Entr., Me. 1873. 74×97. 1000000.
 108. Wells to C. Ann. Me., N. H., and Mass. 1867. 76×96. 1000000.
 109. Boston B. and Approaches. 1872. 75×98. 1000000.
 110. C. Cod B. 1872. 75×98. 1000000.
 111. From Monomoy and Nantucket Shoals to Muskeget Chan. Mass. 1874. 68×95. 1000000.
 113. From Entrance to Buzzard's B. to Block Isl. Mass., and R. I. 1860. 68×95. 1000000.
 114. From Pt. Judith and Block Isl. to Plum Isl. Conn. and Long Isl. 1855. 62×88. 1000000.
 115. From Plum Isl. to Welch's Pt. Conn. and Long Isl. 1855. 62×86. 1000000.
 116. From Welch's Pt. to New York. Conn., Long Isl. and N. Y. 1855. 62×88. 1000000.
 117. Block Isl., Montauk Pt., etc. R. I. and Long Isl. 1857. 62×87. 1000000.
 118. From Napeague Beach to Forge R. Long Isl. 1857. 62×86. 1000000.
 119. Great South B., Fire Isl., and Long Beaches, etc. Long Isl. 1851. 61×90. 1000000.
- Harbor Charts.
302. Eastport Harb., Me. 1876. 45×66. 1000000.
 303. Moose à bec Reach, Me. 1873. 42×56. 1000000.
 304. Mt. Desert, S. W. Harb., and Somes S. Me. 1872. 37×55. 1000000.
 - Somes Sd., Mt. Desert Isl., Me. 1871. 74×173. 1000000.
 311. Fox Islands Thoroughfare, Me. 1868. 51×80. 1000000.
 312. St. George's R. and Muscle Ridge Chan., Me. 1873. 65×94. 1000000.

313. Damariscotta and Medomac Rivers, Me. 1872. 65×97.
 314. Kennebec and Sheepscot Rivers, Me. 1868. 59×98.
 315. Inside Passage, Bath to Booth B., Me. 1867. 42×90.
 316. Castine Harb., Me. 1877. 36×49.
 317. Winter Harb., Me. 1867. 37×48.
 318. Bar Harb., Mt. Desert Isl., Me. 1876. 33×39.
 319. Belfast Harb., Me. 1874. 45×37.
 320. Rockland Harb., Me. 1876. 52×54.
 321. Rockport and Camden Harbors, Me. 1864. 37×44.
 323. Casco B., Me. 1870. 63×96.
 325. Portland Harb., Me. 1871. 65×72.
 327. Richmond's Isl. Harb., Me. 1876. 35×44.
 328. York R. Harb., Me. 1854. 32×40.
 329. Portsmouth Harb., N. H. 1866. 47×66.
 330. Isles of Shoals, N. H. 1874. 37×44.
 332. Ipswich and Annisquam Harbor, Mass. 1857. 48×73.
 333. Rockport Harb., Mass. 1859. 36×44.
 334. Gloucester Harb., Mass. 1855. 35×44.
 335. Salem Harb., Mass. 1875. 52×70.
 337. Boston Harb., Mass. 1867. 71×91.
 338. Plymouth, Kingston, and Duxbury Harbors, Mass. 1875. 47×52.
 339. Barnstable Harb., Mass. 1865. 41×57.
 340. Wellfleet Harb., Mass. 1853. 35×44.
 341. Provincetown Harb., Mass. 1857. 37×44.
 342. Bass River Harb., Mass. 1857. 34×41.
 343. Hyannis Harb., Mass. 1850. 35×47.
 344. Monomoy Passage to Nantucket Shoals, Mass. 1876. 39×60.
 345. Muskeget Chan., Mass. 1859. 52×70.
 346. Edgartown Harb., Mass. 1848. 35×44.
 347. Vineyard Haven, Mass. 1873. 31×46.
 348. Wood's Hole Harb., Mass. 1857. 32×44.
 349. Sippican Harb., Mass. 1866. 37×45.
 350. New Bedford Harb., Mass. 1876. 36×44.
 351. Greenwich B., R. I. 1867. 37×44.
 352. Port of Providence, R. I. 1865. 39×49.
 353. Narragansett B., R. I. (in two sheets). 1873. 76×115.
 354. Bristol B., R. I. 1864. 32×41.
 355. Warren R., R. I. 1866. 37×49.
 357. Wickford Harb., R. I. 1868. 37×44.
 358. Fisher's Isl. Sd., Conn. 1847. 35×44.
 359. New London Harb., Conn. 1848. 35×43.
 360. Mouth of Connecticut R., Conn. 1853. 36×44.
 361. Hart and City Islands and Sachem's Head Harbors, Conn. 1851. 35×43.
 362. New Haven Harb., Conn. 1875. 46×54.
 364. Sheffield's Isl. and Cawkin's Isl. Harbors, Conn. 1849. 35×44.
 365. Captain's Islands, East and West Harbors, Conn. 1849. 35×44.
 366. Hempstead Harb., Long Isl. 1859. 37×46.
 367. Oyster or Syosset B. Harb., Long Isl. 1847. 35×44.
 368. Huntington B., Long Isl. 1849. 36×44.
 369. New York B. and Harb., (in two sheets). 1874. 99×121.
 551. Burlington Harb., Vt. 1875. 47×62.
 551. Burlington Harb., Vt. 1872. 48×52.

552. Plattsburgh and Cumberland B., L. Champlain, N. Y. 1873. 48×55. 150000.
 553. L. Champlain, Vt. and N. Y., No. 1. 1874. 56×75. 150000.
 554. L. Champlain, Vt. and N. Y., No. 2. 1874. 53×75. 150000.
 555. L. Champlain, Vt. and N. Y., No. 3. 1876. 53×74. 150000.
 556. L. Champlain, Vt. and N. Y., No. 4. 1876. 53×75. 150000.
 563. Approaches to Dix Isl., Me., 1874. 45×51. 150000.

PACIFIC COAST.

Sailing Charts.

601. From San Diego to San Francisco, Cal. 1853. 56×57. 150000.
 602. From San Francisco to Umpquah R. Cal. and Oreg. 1854. 56×62. 150000.
 603. From Umpquah R. to the N. W. Boundary. Oreg. and Wash. Ter. 1855. 55×62. 150000.
 Harbor Charts.
 606. San Diego B., Cal. 1877. 52×67. 150000.
 625. Mare Isl. Sts., Cal. 1876. 52×101. 150000.
 640. Columbia R., Oreg. and Wash. Ter. Sheet No. 1. 1875. 61×69. 150000.
 641. Columbia R., Oreg. and Wash. Ter., No. 2. 1875. 61×68. 150000.
 654. Washington Sd. and Approaches, Wash. Ter. 1866. 64×68. 150000.
 662. Puget Sd., Wash. Ter. 1867. 44×70. 150000.
 664. Yaquina R. Entr., Oreg. 1868. 50×52. 150000.

General Charts.

675. (Formerly 616). From Pt. Pinos to Bodega Hd., Cal. 1866. 70×96. 150000.
 — Alaska and Adjoining Territory. 1869. 61×85. —
 Sailing Charts.
 700. From C. Flattery to Dixon Entr., Brit. Columb. 1868. 66×85. 150000.
 701. From Dixon Entr. to C. St. Elias, Alaska. 1868. 65×85. 150000.

702. From Icy B. to Seven Islands, Alaska. 1868. 65×85. 150000.

United States. Engineer's Department, U. S. A.

WHEELER'S SURVEYS.

- Preliminary Report concerning Explorations and Surveys principally in Nev. and Ariz. . . 1871. Wash. 1872. 96 p. 4°. and map.
 Progress-Report upon Geog. and Geol. Explorations and Surveys West of the 100th Meridian in 1872, . . . Wash. 1874. 56 p. 4°. 5 pl. and map.
 Geological Explorations and Surveys West of the 100th Meridian. Wash. 1874. 13 maps, 41×56.
 Geological Explorations and Surveys West of the 100th Meridian. Wash. 1875. 7 maps, 41×56.
 Ann. Report upon the Geog. Explorations and Surveys West of the 100th Meridian in Cal., Nev., Utah, Ariz., Col., N. M., Wyoming and Montana, . . . being Appendix LL of the Ann. Rep. of the Chief of Eng. for 1875. Wash. 1875. iv, 196 p. 8°. 9 pl. 2 maps.
 Ann. Report upon the Geog. Surveys West of the 100th Meridian, in Cal., Nev., Utah, Col., Wyoming, N. M., Ariz., and Montana . . . Appendix JJ of the Ann. Rep. of the Chief of Eng. for 1876. Wash. 1876. vi, 355 p. 4°. 3 maps. [Accompanied by 7 Atlas Sheets.]

OTHER SURVEYS.

- Preliminary Report of Explorations of Neb. and Dakota in the years 1855-'57, by G. K. Warren. Reprint. Wash. 1875. 125 p. 8°. map.
 Report of a Reconnaissance of the Black Hills of Dakota, . . . 1874. Wash. 1875. 121 p. 4°. 2 maps.
 Report of Explorations across the Great Basin . . . of Utah . . . in 1859, by J. H. Simpson. Wash. 1876. 495 p. 4°. map.

Report of the Expl. Exped. from Santa Fé, N. M., to the Junction of the Grand and Green Rivers . . . 1859, . . . J. N. Maccomb, with Geol. Rep. by J. S. Newberry. Wash. 1876. 148 p. 4°. 8 pl. map.

U. S. Geol. Expl. of the 40th Parallel. Clarence King, Geol.-in-Charge. Microscopical Petrography by Ferdinand Zirkel, . . . Wash. 1876. 297 p. 4°. 12 pl.

U. S. Geol. Expl. of the 40th Parallel. Clarence King, Geol.-in-Charge. Descriptive Geology by Arnold Hague and S. F. Emmons. Wash. 1877. 890 p. 4°. 27 pl.

MAPS, each 70×73, Scale, 1:100,000.
Battle Field of Gettysburg.
[Wash. n. d.]

— 1st Day's Battle.
[Wash. n. d.]

— 2d Day's Battle.
[Wash. n. d.]

— 3d Day's Battle.
[Wash. n. d.]

United States.. Department of the Interior. Maps.

[The Maps of this Department bear no numbers or dates.]

1. Map of the Upper Geyser Basin on the Upper Madison River, Montana Ter. 45×50. 6 inches to the mile. col.

2. Map of the Lower Geyser Basin on the Upper Madison River. 55×87. 6 inches to the mile. col.

3. Map of the Sources of the Snake River with its Tributaries, together with portions of the head waters of the Madison and Yellowstone, . . . 66×67. 1:100,000. col.

United States. Department of the Interior. U. S. Geological and Geographical Survey of the Territories. F. V. Hayden, Geologist-in-Charge.

ANNUAL REPORTS.

I-III. First, Second, and Third Ann. Rep. of the Geol. Surv. . . . for the years 1867, 1868, and 1869, . . . Wash. 1873. 261 p. 8°.

iv. Preliminary Rep. of the U. S. Geol. Surv. of Wyoming, . . . Wash. 1872. 511 p. 8°.

v. Preliminary Rep. of the U. S. Geol. Surv. of Montana . . . Wash. 1872. iv, 538 p. 8°. 2 pl. 5 maps.

vi. Sixth Ann. Rep. of the U. S. Geol. Surv. . . . embracing Portions of Montana, Idaho, Wyoming, and Utah . . . Wash. 1873. xi, 844 p. 8°. 12 pl. 5 maps.

vii. Ann. Rep. of the U. S. Geol. and Geog. Surv. . . . Colorado . . . Wash. 1874. xii, 718 p. 8°. pl. and maps.

viii. Ann Rep. of the U. S. Geol. and Geog. Surv. . . . Colorado . . . Wash. 1876. ix, 515 p. 8°. pl. and maps.

ix. Ninth Ann. Rep. of the U. S. Geol. and Geog. Surv. . . . Colorado . . . Wash. 1877. vii, 827 p. 8°. pl.

BULLETINS.

i. 1874-1875. Wash. 1875. 8°. No. 5, Jan. 8, 1876, contains

i. **Lesquereux**, Leo. A Review of the Fossil Flora of N. A. p. 238-248.

ii. **Williams**, S. G. Notes on the Geology . . . near Cañon City, Col. p. 249-251.

iii. **Coues**, Elliott. Some Account . . . of *Zapus hudsonius*. p. 258-262.

iv. ———. On . . . the White-tailed Ptarmigan (*Lagopus leucurus*). p. 263-266.

v. **Uhler**, P. R. List of Hemiptera . . . west of the Mississippi R. . . . p. 267-361. pl. 19-21.

vi. **Lesquereux**, L. On Some New Species of Fossil Plants from the Lignitic Formations. p. 363-389.

vii. ———. New Species of Fossil Plants from the Cretaceous Formation of the Dakota Group. p. 391-400.

viii. **Hayden**, F. V. Notes on the Lignitic Group of Eastern Colorado and . . . Wyoming. p. 401-411.

ix. **Packard**, A. S., Jr. On the Supposed Ancient Outlet of Great Salt L. p. 413-414.

No. 6, Feb. 8, 1876, contains

i. **Coues**, E. An Account of . . . the Travels of Lewis and Clark, . . . p. 417-444.

ii. **Meek**, F. B. Notice of a very large *Goniatite* from Eastern Kan. p. 445-446.

- iii. **Scudder, Samuel H.** Fossil Orthoptera from the Rocky Mountain Tertiaries. p. 447-449.
- iv. **Ridgway, Robert.** Studies of the Amer. Falconidae. p. 461-478. 5 pl.
- v. Index [to all preceding Bulletins], p. 475-499. pl. 1-13.
- ii. 1876. Washington, 1876. 8° No. 1, March 21, 1876, A part, contains [i, ii and iii, as a separate]
- i. **Holmes, W. H.** A Notice of the Ancient Ruins of S. W. Col. . . . p. 3-24. pl. 1-14.
- ii. **Jackson, W. H.** A Notice of the Ancient Ruins in Ariz. and Utah . . . p. 25-45. pl. 15-22, and map.
- iii. **Besseels, Emil.** The Human Remains . . . of S. W. Col. and N. M. p. 47-63. pl. 23-29.
- No. 2, April 1, 1876, contains
- i. **Ridgway, R.** Studies of the American Falconidae. p. 91-182. pl. 30-31.
- ii. ———. Ornithology of Guadeloupe Isl. p. 183-195.
- No. 3, June 5, 1876, contains
- i. **Hayden, F. V.** Notes . . . Geological Sections . . . about the Headwaters of the Missouri and Yellowstone Rivers. p. 197-209. pl. 32-41.
- ii. **Mudge, B. F.** Notes on the Tertiary and Cretaceous Periods of Kan. p. 211-221.
- iii. **Gannett, Henry.** Notes in relation to . . . Contour-Map of the U. S. p. 223-226 and map.
- iv. **Brandegee, T. S.** The Flora of S. W. Col. p. 227-248.
- v. **Scudder, S. H.** Brief Synopses of N. A. Earwigs. . . . p. 249-260.
- vi. ———. List of Orthoptera collected by Dr. A. S. Packard in Col. . . . p. 261-267.
- vii. ———. Notice of a small Collection of Butterflies made by Dr. A. S. Packard in Col. and Utah, in 1875. p. 269-270.
- viii. **Ainslie, George.** Notes on the Grammar of the Nez Percés Language. p. 271-277.
- No. 4, Aug. 4, 1876, contains
- i. **St. John, O.** Notes on the Geology of N. E. New Mex. p. 279-308. pl. 42-49.
- ii. **Allen, J. A.** Geographical Variation among N. A. Mammals . . . p. 309-344.
- iii. ———. Sexual, Individual and Geographical Variation in *Leucosticte tephrocotis*. p. 345-350.
- iv. **Meek, F. B.** Descriptions . . . of Fossils from Vancouver's and Sucia Isl. . . . p. 351-376, pl. 1-4.
- v. ———. Note on the New Genus *Uintacrinus*. p. 375-378.
- iii. 1877. Wash. 1877. 8°. No. 1, April 5, 1877, contains
- i. **Mallery, Garrick.** A Calendar of the Dakota Nation. p. 3-26. pl. 1.
- ii. **Schumacher, Paul.** Researches in the Kjoekkenmoeddings and Graves . . . of Oreg. p. 27-36, pl. 2-8.
- iii. ———. Researches in the Kjoekkenmoeddings of . . . Santa Barbara Islands . . . p. 37-56, pl. 9-22.
- iv. **Eells, M.** The Twana Indians . . . in Wash. Ter. p. 57-114, pl. 23-25.
- v. **Grote, Augustus R.** Notes on a Collection of Noctuid Moths made in Col. . . . p. 115-120.
- vi. **Chambers, V. T.** The *Tineina* of Col. p. 121-142.
- vii. ———. Notes on a Collection of Tineid Moths made in Col. . . . p. 143-146.
- viii. ———. On the Distribution of *Tineina* in Col. p. 147-150.
- ix. ———. New Entomotraca from Col. p. 151-156. fig. 1-4.
- x. **Packard, A. S., Jr.** On a New Cave Fauna in Utah. p. 157-170. fig. 5-10.
- xi. ———. Description of New Phyllopod Crustacea from the West. p. 171-180, fig. 11-17.
- xii. **Hayden, F. V.** On Some Artesian Borings along the Line of the Union Pacific R. R. in Wyoming Ter. p. 181-185. pl. 26.
- No. 2, April 30, 1877, contains
- xiii. **Osten Sacken, C. R.** Western Diptera . . . p. 189-354.
- xiv. **Uhler, P. R.** Report upon the Insects Collected . . . during the Explorations of 1875, including Monographs of the Families Cydnidae and Saldæ, and the Hemiptera . . . p. 355-475, pl. 27-28.
- xv. **Thorell, T.** Descriptions of the Araneæ Collected in Col. in 1875 . . . p. 477-529.
- No. 3, May 15, 1877, contains
- xvi. **Barber, Edwin A.** Comparative Vocabulary of Utah Dialects. p. 533-545.
- xvii. **Schumacher, P.** Methods of Making Stone Weapons. p. 547-549, pl. 29.
- xix. **Cope, E. D.** Report on the Geology of the Region of the Judith R. Montana, and on Vertebrate Fossils Obtained on or near the Missouri R. p. 555-597, pl. 30-34.
- xx. **White, C. A.** Descriptions of Unionidae and Physidae . . . from the Judith R. Group of Montana Ter. . . . p. 599-602.
- xxi. ———. Descriptions of New Species of Uniones and a New Genus of Fresh-water Gasteropoda

from the Tertiary Strata of Wyoming and Utah. p. 603-606.

xxii. ———. Catalogue of the Invertebrate Fossils . . . from the Fresh and Brackish-water Deposits of the Western Portion of N. A. p. 607-614.

xxiii. ———. Comparison of the N. A. Mesozoic and Cenozoic Unionidæ . . . p. 615-624.

xxiv. ———. Remarks upon the Palaeontological Characteristics of the Cenozoic and Mesozoic Groups as Developed in the Green R. Region. p. 625-629.

xxv. **Cones, E.** Precursory Notes on Amer. Insectivorous Mammals, with Descriptions of New Species. p. 631-653.

xxvi. **McCauley, C. A. H., and Cones, E.** Notes on the Ornithology of the Red R. of Tex. . . . p. 655-695.

xxvii. **Aughey, Samuel.** Catalogue of the . . . Shells of Neb. p. 697-704.

xxviii. **Wilson, A. D.** Notes on the Geographical Work of the U. S. Geol. and Geog. Surv. of the Ter. p. 705-737, pl. 35-39.

No. 4, August 15, 1877, contains

xxix. **Scudder, S. H.** The First Discovered Traces of Fossil Insects in the Amer. Tertiaries. p. 741-762.

xxx. ———. Description . . . of Carabidæ . . . of Scarboro' Heights, near Toronto, Can. p. 763-764.

xxxi. [Continuation of xiv.] p. 765-802.

xxxii. **Streets, Thomas H.** Descr. of *Cambarus Couesi*, . . . from Dakota. p. 802-804.

xxxiii. **Cope, E. D.** On a Carnivorous Dinosaurian from the Dakota Beds of Col. p. 805-806.

xxxiv. ———. A Contribution to the Knowledge of the Ichthyological Fauna of the Green R. Shales. p. 807-820.

xxxv. ———. On the Genus *Erisichthe*. p. 821-823.

BULLETINS, U. S. ENTOMOL. COMM.

No. 1. Destruction of the Young or Unfedged Locusts. Wash. 1877. 12 p. 8°.

No. 2. On the Natural History of the Rocky Mountain Locust, . . . Wash. 1877. 15 p. 8°. incl. map.

MISCELLANEOUS PUBLICATIONS.

No. 1. Lists of Elevations principally in that Portion of the U. S. West of the Mississippi . . . by Henry Gannett. 4th ed.

Wash. 1877. x, 167 p. 8°. map.

No. 4. Synopsis of the Flora of Col., by Thomas C. Porter and John M. Coulter. Wash. 1874. v, 180 p. 8°.

No. 7. Ethnography and Philology of the Hidsata Indians, by Washington Matthews, Wash. 1877. vi, 239 p.

No. 8. Fur Bearing Animals: A Monograph of N. A. Mustelidæ, . . . by Elliott Cones. Wash. 1877. xiv, 348 p. 8°. xx pl.

MONOGRAPHS.

Vol. I, Part I. Contributions to the Extinct Vertebrate Fauna of the Western Territories. By Joseph Leidy. Wash. 1873. 358 p. 4°. 37 pl.

Vol. II. The Vertebrata of the Cretaceous Formations of the West. By E. D. Cope. Wash. 1875. iv, 302 p. 4°. 57 pl.

Vol. V. Synopsis of the Acrididæ of N. A. By Cyrus Thomas. Wash. 1873. x, 262 p. 4°. 1 pl.

Vol. VI. Contributions to the Fossil Flora of the Western Territories. Part I. The Cretaceous Flora. By Leo Lesquereux. Wash. 1874. 136 p. 4°. 30 pl.

Vol. IX. A Report on the Invertebrate, Cretaceous and Tertiary Fossils of the Upper Missouri Country. By F. B. Meek. Wash. 1876. lxiv, 629 p. 4°. 45 pl.

Vol. X. A Monograph of the Geometrid Moths or Phalenidæ of the U. S. By A. S. Packard, Jr. Wash. 1876. iv, 607 p. 13 pl.








United States. Department of the Interior. National Museum.

BULLETIN.

1. Check list of N. A. Batrachia and Reptilia, with a Systematic List of the Higher Groups and an Essay on Geographical Distribution . . . by E. D. Cope. Wash. 1875. 104 p. 8°.

2. Contributions to the Natural History of Kerguelen Island,

- ... by J. H. Kidder. 1. Ornithology. Edited by E. Coues. Wash. 1875. 51 p. 8°.
3. Contributions to the Natural History of the Kerguelen Isl. ... by J. H. Kidder. 1. Wash. 1876. 122 p. 8°.
4. Birds of S. W. Mexico ... by G. N. Lawrence. Wash. 1875. 56 p. 8°.
5. Catalogue of the Fishes of the Bermudas ... by G. B. Goode. Wash. 1876. 82 p. 8°.
6. Classification of the Collection to illustrate the Animal Resources of the U. S. ... by G. B. Goode. Wash. 1876. 126 p. 8°.
7. Contributions to the Natural History of the Hawaiian and Fanning Isl. and Lower Cal., by T. H. Streets. Wash. 1877. 172 p. 8°.
8. Index to the Names ... of Brachiopoda, by W. H. Dall. Wash. 1877. 88 p. 8°.
9. Contributions to N. A. Ichthyology, No. 1. Review of Rafinesque's Memoirs on N. A. Fishes. By D. S. Jordan. Wash. 1877. 53 p. 8°.
- United States.** Department of the Interior. U. S. Geographical and Geological Survey of the Rocky Mountain Region, J. W. Powell, Geologist in Charge.
1. Contributions to N. A. Ethnology, vol. i. Wash. 1877. viii, 361 p. 4°. 2 maps.
- Dall, W. H. Tribes of the Extreme Northwest.
- Gibbs, George. Tribes of Western Washington and Northwestern Oregon.
- United States.** Department of the Interior. U. S. Geological and Geographical Survey of the Territories.
11. Division. Report on the Geology of the E. Portions of the Uinta Mountains ... with Atlas [F° of 8 pl.]. By J. W. Powell. Wash. 1876. vii, 218 p. 4°. 1 pl.
- United States.** Senate. Executive Doc.
- No. 51, 4th Cong. 3d Sess. Report of Lieut. Gustavus C. Doane upon the so-called Yellowstone Exped. of 1870. Wash. 1873. 40 p. 8°.
- United States.** War Department (v. also U. S. Engineer's Dept.). Maps.
- [The Maps of the Dept. have no numbers.]
- GENERAL.**
1. Military Map of the U. S. 1870. 88×130. 1000000 col. EASTERN U. S.
2. Military Map of Middle Tenn., with Parts of East Tenn., and Adjoining States. 1874. 87×140.
3. Map of ... Fla. 1875. 91×97.
- WESTERN U. S.**
4. Territory of the U. S. from the Mississippi R. to the Pacific Ocean. 1865-1873. 107×118. 1000000. Territory of Alaska [on the same sheet] 1000000.
5. Western Territories, Sheet 2. 1876. 46×63. 1000000.
6. Western Territories, Sheet 3. 1876. 50×66. 1000000.
7. Campaign Map of the Department of the Platte. Nos. 1-4. 1000000.
- No. 1, Comprising that Portion of Neb. lying between Long. 97°-100° and Lat. 39° 30'-43° 30'. 1874. 42×74.
- No. 2, Comprising that Portion of Neb. lying between Long. 100°-103° and Lat. 39° 30'-43°-30'. 1873. 42×74.
- No. 3, Comprising that Portion of Neb. and Wyoming lying between Long. 103°-106° and Lat. 41°-45°. 1874. 42×74.
- No. 4, Comprising that Portion of Wyoming lying between Long. 106°-109° and Lat. 41°-45°. 1874. 42×74.
8. Map of the Military Department of the Platte, Neb. 1872. 49×65. 1000000.
9. Map of the Military Department of the Platte, Wyoming. 1874. 43×70. 1000000.
10. Map of the Yellowstone and Missouri Rivers and their Tributaries. 1876. 80×103. 1000000.

11. Sketch of Yellowstone L. and Valley of the Upper Yellowstone R. 1871. 30×69. 
12. Map of Neb. and Dakota, etc. 1867. 81×110. 
13. Map of . . . Kan. and Tex. and Ind. Ter., with Parts of the Territories of Col. and N. M. 1874. 87×119. 
14. Military Map of Ind. Ter. 1875. 104×136. 
15. Map Showing Detailed Topography of the Country Traversed by the Reconnaissance Exped. through S. and S. E. Nev. in 1869. 51×91. 12 miles to the inch.
16. Preliminary Map of the Surveys in Col. made on Reconnaissance in the Ute Country. 1873. 51×67. 
17. Map showing the Lines of Communication between S. Col. and Northern N. M. 1876. 35×47. 
18. District of N. M. 1875. 51×55. 
19. Dept. of Ariz., Sheets 1-2. Sheet 1, 1876. 48×52. Sheet 2, 1876. 48×52.

United States. War Department. (v. also U. S. Engineer's Department.) Reports, etc.

Pacific R. R. Survey. Memoir to accompany a Map of the Territory of the U. S. from the Mississippi R. to the Pacific Ocean . . . G. K. Warren. Wash. 1859. 120 p. 4°.

Report of an Expedition up the Yellowstone River, . . . 1875, by Jas. W. Forsyth and F. D. Grant. Wash. 1875. 17 p. 8° map.

Report of a Reconnaissance from Carroll, Montana Ter., . . . to the Yellowstone National Park . . . 1875, by Wm. Ludlow. Wash. 1876. 145 p. 4°. 2 pl. map.

Vermont.

History of the St. Albans Raid. Annual Address before the Vt. Historical Soc., delivered at Montpelier, Vt., . . . 1876, by Edw. A. Sowles. St. Albans, 1876. 48 p. 8°.

Records of the Gov. and Council . . . vol. v. . . . Montpelier, 1877. iv, 569 p. 8°. 4 pl.

Officers for 1878.

President, CHARLES E. FAY.

Vice-President, C. H. HITCHCOCK.

Secretary, J. B. HENCK, JR.

Treasurer, H. F. WALLING.

COUNCILLORS:

Natural History, W. H. NILES.

Topography, J. RAYNER EDMANDS.

Art, JOHN WORCESTER.

Exploration, J. H. HUNTINGTON.

Improvements, W. G. NOWELL.

Members added since June, 1877.

HONORARY.

Daly, Charles P., New York.

Petermann, A., Gotha, Germany.

Malte-Brun, V. A., Paris, France.

Rawlinson, Henry, London, Eng.

CORRESPONDING.

Comstock, C. B., Detroit, Mich.

Marcou, Jules, Paris, France.

Dawson, G. M., Montreal, P. Q.

Powell, J. W., Washington, D.C.

Dietrichson, N. G., Christiania,
Norway.

Saussure, Henri de, Geneva, Switz.

Humphreys, A. A., Wash'ton, D.C.

Warren, G. K., Washington, D.C.

Lesley, J. P., Philadelphia, Pa.

Wheeler, G. M., " "

ACTIVE.

Appleton, Miss G. P., Roxbury, Ms.

McEntee, Jervis, Rondout, N. Y.

Burton, H. J., Jr., Boston, Mass.

Monks, Robert H., Boston, Mass.

Cobb, Henry N., Millbrook, N. Y.

Morrison, Mrs. M. E., Camb'ge, Ms.

Cross, Mrs. M. P., Boston, Mass.

Morrison, W. A., Cambridge, "

Denniston, A. C., Philadelphia, Pa.

Olmsted, Miss Helen G., Boston, "

Gardiner, Frederic, Jr., Camb., Ms.

Parker, Miss M. G., Cambridge, "

Hale, Arthur, Cambridge, Mass.

Richards, C. A. L., Providence, R. I.

Hammond, Geo. F., Roxbury, Mass.

Schouler, James, Boston, Mass.

Hasbrouck, J. Howard, " "

Starr, Theodore, Philadelphia, Pa.

Inches, Geo. B., Boston, " "

Strong, George A., Gambier, Ohio.

Judson, Oliver A., Philadelphia, Pa.

Wellington, C. A., Lexington, Mass.

Kennard, Charles W., Boston, Mass.

Whitney, S. F., Watertown, "

Lewis, Elias, Jr., Brooklyn, N. Y.

Winslow, Samuel W., Boston, "

Proceedings of the Club.

July 24, 1877. — Fourth Field Meeting.

Held at the Fabyan House, White Mts., N. H.

Vice President Fay in the chair.

Prof. Hitchcock read a paper on *Glacial Markings among the White Mts.* (See p. 243.)

Prof. Clarke described several trips about the Franconia Mts., made by himself and Prof. Cross, and gave the results of some barometrical measurements of heights made on the way. He recommended the name Mt. Samoset for the summit next south of Mt. Lincoln. Also that the name Profile Mt. be used to designate the whole mass of the mountain forming the west side of Franconia Notch, and the name Cannon Mt. as a subordinate designation of the higher of its two summits.

Mr. W. H. Pickering gave an account of ascents recently made by him of Mts. Blue, Abraham, and Saddleback in Maine. He also spoke of the inaccurate placing of several of the milestones on the Mt. Washington carriage-road, one of the miles being too long and several others too short.

Mr. Lowe described the paths which he had made up Mt. Adams and through King's Ravine.

Mr. Scott made some additional remarks about these paths.

Prof. Pickering spoke of some observations on the refraction of the atmosphere, which he had just made during a week's stay on Mt. Washington.

Mr. Henck showed a new plane-table which he had recently constructed for mountain work.

The meeting then adjourned.

On Wednesday, July 24th, a party of about thirty ladies and gentlemen made an excursion to the summit of Mt. Washington, some by rail and others on foot, by the Crawford Bridle-Path. A portion of the party returned the same day by rail, while others descended on foot by the Crawford Path and by way of Mt. Adams and Lowe's Path. Others remained on the summit over night, descending in the morning by rail and by Lowe's Path.

October 10, 1877. — Fifteenth Regular Meeting.

President Scudder in the chair.

President Scudder read a paper describing an Ascent of Sierra Blanca. (See p. 258.)

Dr. Hunt made some remarks on the geology of the region about the Sierra Blanca; also on that of the Black Mts. of North Carolina.

The causes of the bare spots commonly found on the summits of mountains were discussed by Dr. Hunt and others.

Mr. Edmands showed a rubber blanket which had been used to wrap up an instrument which he had to leave on the summit of Mt. Starr King for several weeks, and called attention to the destruction of the rubber as if by the teeth of some animal. The discussion seemed to point to either squirrels or porcupines as most likely to have caused the trouble.

Mr. Scott and Mr. Edmands made some remarks on the ascent of Mt. Adams through King's Ravine.

Prof. Fay spoke of the importance of noting the times occupied in passing over the several sections and the whole of any walks or mountain ascents.

Prof. Pickering called attention to the importance of the mountain circular proposed by him last year, for the purpose of reporting records of such times and other observations.

The meeting then adjourned.

November 14, 1877. — Sixteenth Regular Meeting.

President Scudder in the chair.

The Secretary read a letter from Mr. Geo. C. Mann, resigning his place on the Committee on Exploration. The chair was requested to fill the vacancy, and appointed Mr. E. F. Fenollosa a member of the committee, designating Miss Whitman as chairman of the same.

Mr. Edmands, as Councillor on Topography, made a report on the work done in his department during the summer. (See p. 275.) He recommended an extension of the system of nomenclature adopted by the Club, and after some discussion moved that the matter be referred to a committee of three. Prof. Pickering, Mr. Edmands, and Col. Folsom were appointed.

Mr. Nowell, as Councillor on Improvements, made a report of progress in his department. (See p. 286.)

Prof. Fay submitted the report of the Committee on the Name of the Northern Kearsarge. (APPALACHIA, No. 3, p. 152.)

Mr. Fox moved that the report be accepted.

Mr. Emery moved, as an amendment, that it be laid on the table for future discussion. In support of this motion he read a paper criticizing the report and claiming that his side of the question had not been fairly represented.

The question was discussed by Messrs. Fay, Nowell, Edmands, Fox, and Emery, and the Secretary read a letter from Prof. Hitchcock.

A vote being taken, Mr. Emery's amendment was rejected, and Mr. Fox's motion carried.

Mr. Willis moved a vote of thanks to the Committee, which was passed.

The meeting then adjourned.

December 12, 1877. — Seventeenth Regular Meeting.

President Scudder in the chair.

Col. Folsom, Prof. Niles, and Mr. Whitney were appointed a committee to report nominations for officers to be elected at the next meeting.

Prof. Pickering, from the committee to whom the matter was referred, reported a memorial to Congress urging the appropriation of funds for the prosecution of the work of the Coast Survey in aid of State surveys.

The report was accepted, and the President and Secretary were authorized to sign and transmit the memorial.

Prof. Pickering, from the same committee, reported that in the opinion of the committee it was inexpedient for the Club to take any action with reference to the Arctic Expedition proposed by Capt. Howgate.

The report was accepted.

Prof. Lanza read a paper describing an Ascent of Scar Ridge. (See p. 247.)

Mr. Upham read a paper on the Unnamed Mountains between Mt. Hancock and Scar Ridge. (See p. 252.)

Prof. Huntington proposed that the mountain, which Mr. Upham proposed to name for him, be called Mt. Occum, after one of the old Indian chiefs.

Prof. Pickering spoke of the naming of Mts. Bond and Guyot by the Club last year, and the question which had arisen as to their identity.

Mr. Worcester read his autumn report as Councillor on Art. (See p. 277.)

Mr. W. H. Pickering, for the Committee on Exploration, reported a form for the proposed blank to be used in collecting information concerning the mountains.

After some discussion the matter was referred back to the committee.

The meeting then adjourned. •

January 9, 1878. — Eighteenth Regular Meeting.

President Scudder in the chair.

Officers for the ensuing year were elected. (See p. 300.)

President Fay in the chair.

President Scudder in retiring from the chair delivered the address printed on page 207.

The Secretary and Treasurer presented their annual reports. (See pp. 272, 273.)

Mr. W. H. Pickering, from the Committee on Exploration, reported a revised form of mountain circular.

After some discussion it was voted to amend the circular by adding a

request for a complete tabular statement of the times of starting and stopping on the walks reported. The report as amended was adopted.

Col. Folsom offered the following resolutions:—

Resolved: That with a view of enlarging the number of members directly engaged in the work of the Club, and of procuring more full results of their researches or studies for our meetings, it is desirable that the Councillors organize voluntary sections or committees for furthering the work of their several departments.

Resolved: That to this end ballots or cards shall be distributed, on which the members are requested to write their names, together with those Departments, if any, in which they are willing to lend their assistance to the Councillor in organizing a Section or Committee.

Resolved: That each Section or Committee shall meet for concerted action at such times and places as the Section shall itself determine in connection with the Councillor.

Resolved: That it is desired that the work of the Sections (which shall be purely voluntary), shall be aimed at preparing materials or reports for the information of the Club as a whole.

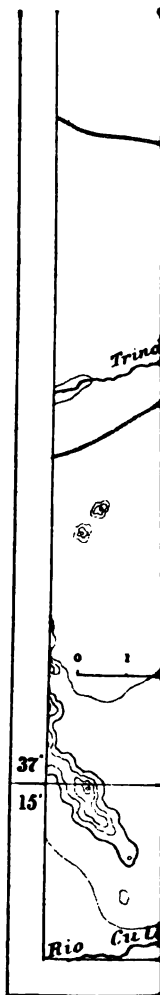
On motion of Mr. Nowell they were referred to a committee of three, consisting of Col. Folsom (chairman), and Profs. Pickering and Niles.

Mr. Worcester read a paper on the new path up Moat Mt. in North Conway. (See p. 267.)

Mr. Henck moved that a committee of three be appointed to consider the advisability of the Club's applying for an act of incorporation, and to report what steps were necessary in order to secure such act.

Mr. Scudder, Prof. Henck, and Col. Folsom were appointed.

The meeting then adjourned.



3 2044 029 409 679

